Dental Digest

July 1955

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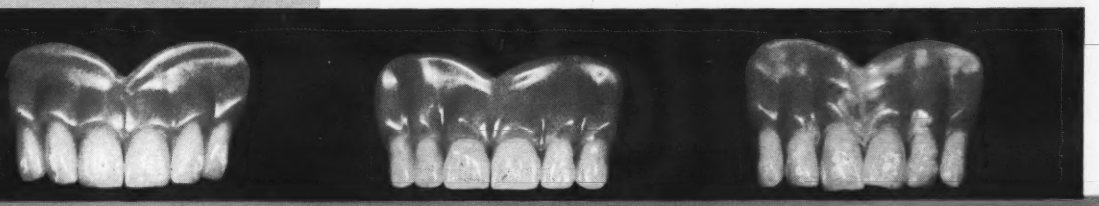

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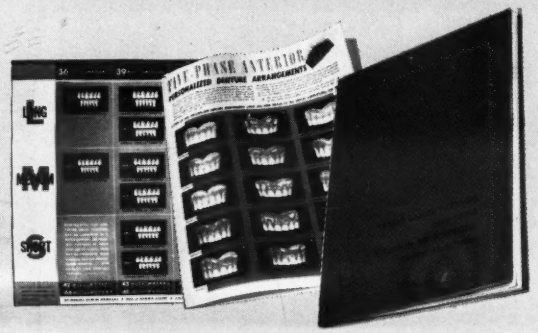

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Vol. 61, No. 7

Dental Digest

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JULY 1955

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708 Church Street, Evanston, Illinois

The magazine is mailed on the fifteenth of the month of issue.

About Our CONTRIBUTORS

CARL STONER, D.D.S. (Indiana University, School of Dentistry, 1944) is specializing in complete oral rehabilitation. He is a member of the Federation Dentaire Internationale, the American Association for the Advancement of Science, and was recently elected president for the coming year of the New London County Dental Association. Doctor Stoner's first publication in DIGEST is an illustrated article, THE USE OF SELF-CURING RESIN IN THE TEMPORARY SPLINTING OF TEETH.

HARRY MAETH, D.D.S. (Columbia University, 1925) has been a regular contributor to DIGEST since 1944. Doctor Maeth is a member of the American Association for the Advancement of Science and the American Association of Endodontists. He presents in this issue the report of an unusual case history, COMPLETE UPPER DENTURE TREATMENT IN THE CASE OF A FIVE-YEAR-OLD GIRL.

JOHN W. CORCORAN, A.B. (Miami University, 1948), D.D.S. (Western Reserve University School of Dentistry, 1953) is engaged in the practice of anesthesiology and pedodontics. His co-author, ROBERT A. HINGSON, A.B. (University of Alabama, 1935), M.D. (Emory University, 1938) has published seventy-five articles and four textbooks on the subject of anesthesia and has had many years of experience in teaching anesthesiology. Doctor Corcoran and Doctor Hingson collaborate in presenting A NEW PORTABLE RESUSCITATOR AND ANESTHETIC GAS MACHINE which was invented and developed by Doctor Hingson with the cooperation of his colleagues at Western Reserve University.

HENRY A. COLLETT, D.D.S., Commander USN (DC) (Temple University, School of Dentistry, 1939) is head of the Department of Prosthodontia at the Naval Dental Clinic, Brooklyn; consultant instructor for advanced prosthodontics in connection with the Navy residency program; and Diplomate of the American Board of Prosthodontics. Doctor Collett is a former contributor to DIGEST. His present article is BIOLOGIC APPROACH TO CLASP PARTIAL DENTURES.

LEO B. DILLON, D.D.S. (Vanderbilt University School of Dentistry, 1916) is a general practitioner who has published numerous articles on various phases in dentistry. For his first appearance in DIGEST he presents SIMPLIFIED TECHNIQUE FOR FULL DENTURE IMPRESSIONS.

The Use of Self-Curing Acrylic Resin in the TEMPORARY SPLINTING *of Teeth*

CARL STONER, D.D.S., New London, Connecticut

DIGEST

The advantages of stabilizing periodontally involved teeth have been discussed extensively and with increasing frequency during the last decade. It is generally accepted today that absolute fixation during or after periodontal treatment brings many mobile teeth, formerly thought hopeless, within the scope of successful treatment. The purpose of this article, however, is not to discuss the rationale of splinting, but to present a simplified clinical technique for the construction of one of several types of intermediate or temporary splints. The steps in the procedure are illustrated.

Techniques for Temporary Splinting

Some techniques for temporary splinting do not involve preparations of the teeth. A few of these are listed in Figure 1 under column A. Column B lists a few types of splints which do require preliminary preparation of the teeth and, when necessary, it is only by these or similar methods that complete immobilization of the teeth can be achieved. The technique discussed in this article is in the last category (self-curing acrylic crowns) and is applicable only when the teeth will subsequently require permanent crowns due to the nature of the periodontal or prosthetic condition.

Former Problems in Technique—Until the advent of self-curing acrylics the construction of a temporary splint involved a process similar to that used for the construction of full gold crowns. In the anterior region where esthetic requirements could be met only with acrylic, (1) impressions, (2) detailed laboratory procedures, and (3) the necessity of a second appointment for insertion made this also an inconvenient and costly procedure. Another problem was the necessity for protecting the prepared teeth with some form of coverage during the interim between these appointments.

Requirements of a Temporary Splint—The following are some of the requirements of a temporary splint:

1. Absolute fixation for involved teeth should be provided.
2. Esthetic considerations should be satisfied.
3. The temporary splint can be made and cemented during the same visit when the teeth are prepared.
4. Missing teeth should be supplied.
5. Occlusion should be maintained or restored.
6. The temporary splint should be noninjurious to the pulp or gingival tissue.
7. It should possess durability.
8. It should be possible to alter or add to the splint without remaking.
9. The temporary splint should be easy to remove and replace when necessary.
10. It must be inexpensive to construct.

New Techniques Reported

Many of the techniques for the use of self-curing acrylic in splinting teeth which have recently been recorded involve complicated time-consuming steps or result in an unsatisfactory splint. Talkov[1] and Leff[2] have described two techniques of comparable merit with which the author has had a varying degree of success.

Alginate Impression Used—Both of the techniques referred to employ the use of a preoperative alginate impression:

1. The first method uses this impression as a mold which is filled with soft self-curing acrylic and reseated over the prepared teeth.
2. The second technique uses the impression to form an acrylic shell the shape of the original teeth by painting a layer of acrylic with the brush technique on the inside of the impression in the teeth to be splinted. This shell, removed from the impression, is then filled with acrylic and seated over the preparations.

Modifications may be Required—These techniques have merit in cases where no alteration of the teeth, occlusion or arch form is necessary; or if no teeth are to be replaced. When

[1]Talkov, Leo: Temporary Acrylic Fixed Bridgework and Splints, J. Pros. Dent. **2**:693-702 (Sept.) 1952.
[2]Leff, Alexander: An Improved Temporary Acrylic Fixed Bridge, J. Pros. Dent. **3**:245-249 (Mar.) 1953.

A. No Preparation of Teeth	B. Teeth Must Be prepared
1. Wire ligature	1. Inlays of gold or acrylic
2. Soldered orthodontic bands	2. Full gold crowns
3. Acrylic stent	3. Acrylic crowns (heat cured)
4. Cast continuous clasp type	4. Self-curing acrylic crowns

Figure 1.

these complications exist, modification becomes necessary and in so doing defeats the purpose of the technique.

Satisfactory Method Evolved

In cases requiring extensive splinting, experience has shown that some correction of occlusion or arch form is usually necessary or at least desirable even in the intermediate stages of treatment. For this reason a method of splint construction was devised which is not limited by the preoperative tooth or arch form.

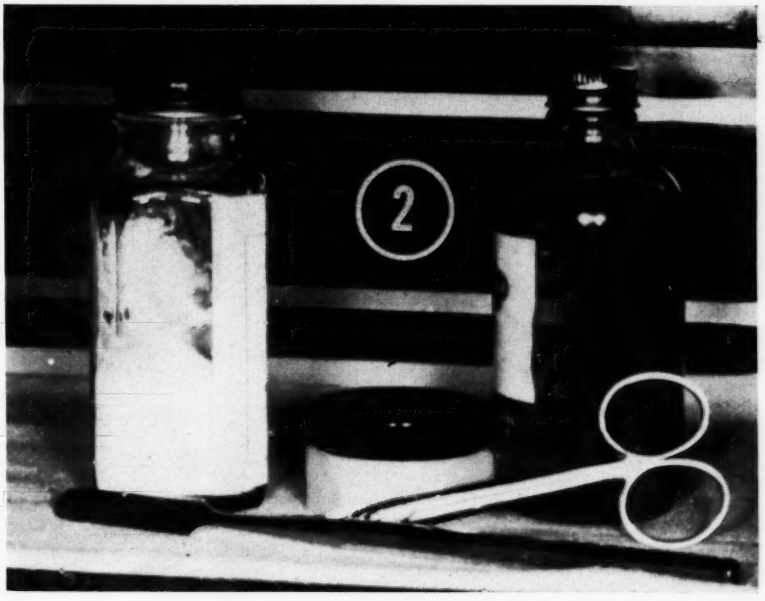
Advantages—The method evolved fulfills all the previously listed requirements of a temporary splint and requires only materials commonly found in most dental offices, or those which are readily available. No impressions or models are required and it is made directly in the mouth at the time of tooth preparation.

Materials Required—The following materials will be needed:

1. Tooth color acrylic powder (Getz Plastic Model Material, powder only)
2. Acrylic liquid (DuraBase Liquid)
3. Small mixing jar
4. Cement spatula
5. Curved crown shears
6. Acrylic lathe wheel
7. Jo-dandy disc and heatless stones
8. Zinc oxide-eugenol resin cement

Liquid Used with Color Powder: The tooth color powder is one that is marketed for the purpose of making plastic demonstration models. The liquid ordinarily used with this powder has an extremely distasteful odor making it unsuitable for use in the mouth. After some experimentation it was found that the liquid of a popular immediate denture rebasing acrylic worked quite well with the tooth color powder.

Other Materials Suitable: Materials used in the placement of plastic restorations are also suitable for this technique, but because of the quantity used it would become quite expensive and therefore the inexpensive model acrylic is recommended (Fig. 2).



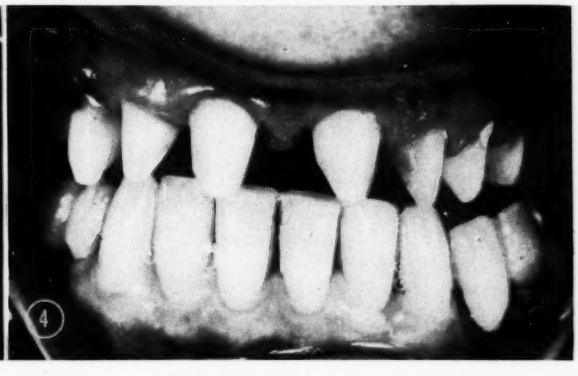
2. ***Materials to be used.***

Procedure

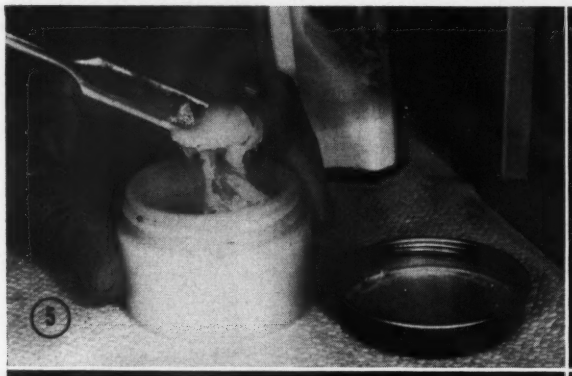
The involved teeth are prepared for full coverage under local anesthesia (Figs. 3 and 4). These may or may not be finished preparations: (1) If a final splint is to be constructed in the near future, it is advisable that the preparations be completed at this sitting. (2) If the temporary splint is to be worn for several months during periodontal treatment, the preparations may be incomplete as additional altering will be necessary later due to changes in the position of the gingival margin.

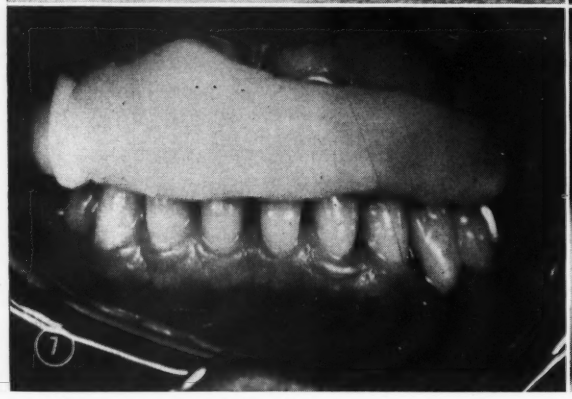
Acrylic is Mixed—A suitable quantity of rebase liquid, depending on the number of teeth to be crowned, is poured into a small mixing jar and enough tooth color acrylic powder added to it to form a syrupy consis-

3. ***Preoperative view.***

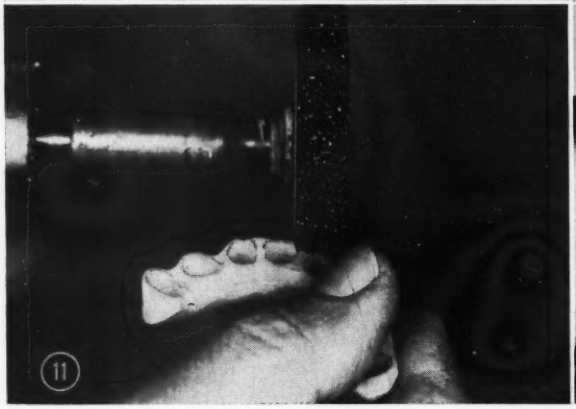


4. ***Full crown preparations.***





5. *Sticky: not ready for use.*
6. *Proper doughy stage.*
7. *Molded over teeth.*
8. *Excess trimmed with crown shears.*



9. *Acrylic set before carving and polishing.*
10. *Margins marked with pencil.*
11. *Lathe wheel.*
12. *Carved and polished.*

tency, slightly thicker than maple syrup. It should definitely be fluid; this allows it to be mixed without incorporating air bubbles. The jar is covered and allowed to stand. The material should not be mixed during the period of thickening in the jar as this would tend to trap air and result in a porous finished product. Depending on the humidity and temperature, the material should be ready to use in five to ten minutes.

Means to Conserve Time—The assistant can mix the powder and liquid in the jar approximately ten minutes before the preparations are completed; or copper bands can be fitted or wax bites taken during this waiting period. Do not attempt to use the acrylic until it has reached a putty or doughy consistency. If it tends to string out or stick to the fingers it is not yet ready (Fig. 5).

Plastic Molded—The doughy plastic is molded in the fingers to a rectangular block the length of the span to be covered and about the thickness of the little finger (Fig. 6). A slight amount of vaseline on the finger tips will make it easier to manipulate.

Method of Application—The following steps may be taken:

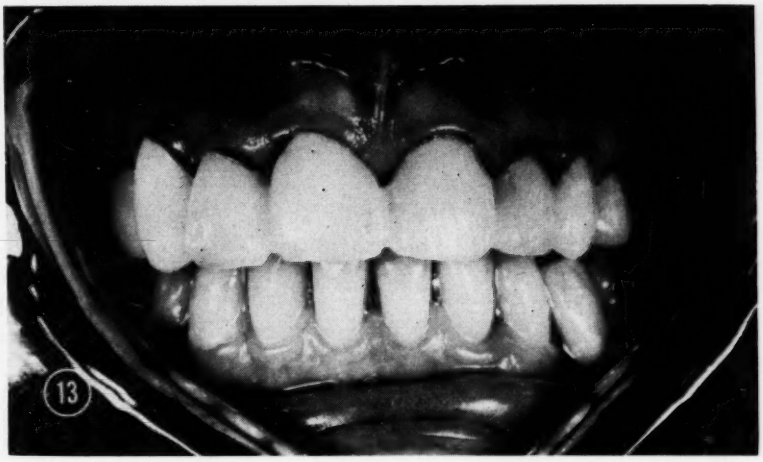
1. The molded plastic is placed across the occlusal or incisal edges of the prepared teeth and pressed down and adapted over the labial and lingual surfaces, covering all of the preparations and part of the marginal gingiva.

2. At the same time that the material is forced interproximally, the opposing teeth are moistened with saliva and the patient is instructed to close (Fig. 7).

3. While the teeth are in occlusion, a finger is placed over the labial acrylic to prevent it from spreading in the gingival area.

4. The patient opens the mouth and the lingual portion is pressed to readapt the plastic as occluding will have caused it to spread away from the preparations.

5. By this time the acrylic has reached a rubbery consistency and can be removed from the mouth. Extreme care must be taken in this maneuver to prevent gross distortion in handling.



13. ***Temporary splint in place.***

6. With a curved crown shears the excess acrylic is trimmed at the gingival margin and from the ends of the splint (Fig. 8). At intervals the patient is instructed to rinse with lukewarm water. The acrylic must be immediately replaced over the teeth and carefully readapted where handling and trimming have caused distortion.

7. The splint should be removed, rinsed, and replaced several times during the setting period to eliminate the taste and also to reduce the excessive heat created during polymerization. It is extremely important, however, that the final set take place while the splint is over the preparations to prevent distortion (Fig. 9).

Completion of Procedure

1. About ten or 15 minutes have elapsed since the material was mixed in the jar. It is now necessary to carve and polish the splint so that it is comfortable and esthetically pleasing. Most of the trimming can be quickly and satisfactorily accomplished on an acrylic cutting lathe wheel in the laboratory.

2. Before trimming, however, the margins of the preparations as shown in the acrylic should be marked with a pencil so that they are clearly visible and can serve as a guide during trimming (Figs. 10 and 11).

3. A Jo-dandy disc is used for carving the individual teeth with the help of heatless stones (Fig. 12).

4. Final polishing is done with pumice and acrylic polish on the lathe in the usual manner.

5. Some adjusting may be advisable in the mouth for esthetics and occlusion. The splint is then cemented to place using a zinc oxide-eugenol resin cement with a small amount of vaseline mixed in with it (Fig. 13). This permits the splint to be removed and replaced easily when necessary for the purpose of finishing preparations, and trying in crowns.

6. It is usually not necessary to mix a new batch of cement each time adjusting is done as the cement will remain intact when the splint is removed and permit good retention each time it is replaced.

Simplicity an Advantage—Because of its simplicity this technique offers the advantage of extreme flexibility in accommodating many variables in practical cases.

Alterations and Additions—It is possible to add to the occlusal surface and alter occlusion at a later date by mixing a new batch of acrylic and placing it across the occlusal surface of the previously constructed splint. If a small amount of liquid is brushed on the splint first, adhesion of the old and new acrylic is assured.

New Crowns and Splints Made Later—It is not necessary to make all of the preparations to be included in the splint at one sitting. New crowns

14. *Case with first bicuspid, first molar, and third molar, prepared for full coverage.*

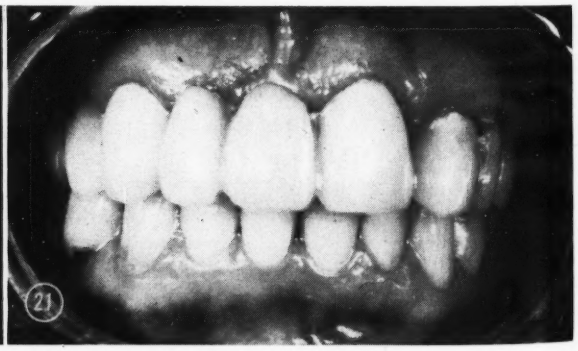
15. *Doughy acrylic being pressed over the teeth.*

16. *The patient closes in occlusion. Note upper temporary bridge previously made with this technique. The acrylic mix will not stick to the polished bridge if it is of this doughy consistency.*

17. *At the rubbery stage it is carefully removed from the mouth, excess is trimmed with crown shears and replaced for correction and set.*

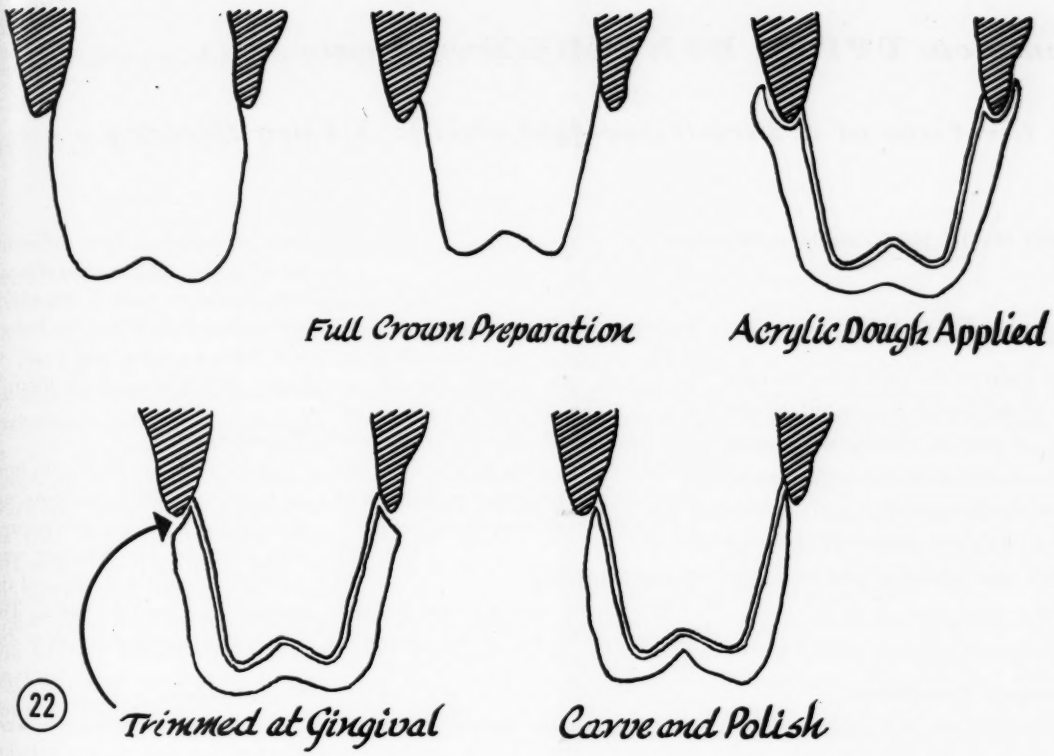
18. *Appearance after trimming on lathe wheel.*

19. *Carved, polished, and cemented with zinc oxide-eugenol rosin cement.*



20. *Case requiring tooth replacement and arch form change.*

21. *Temporary splint in place.*



or splints can be made at each appointment as the teeth are prepared and joined to the previous splint by adding acrylic with the brush technique at the contact point.

22. ***Diagrammatic sketch of steps in making acrylic splint.***

Summary

A technique has been presented for the construction of a temporary acrylic splint or bridge using self-curing acrylic resin. It is applicable to all situations requiring full crown preparations of the teeth.

This method requires somewhat more digital dexterity and artistic application than previously recommended techniques. It would be difficult, however, to visualize a dentist capable of doing routine operative dentistry and full crown preparations who would not also be capable of carving out the individual plastic teeth and crowns and polishing the splint described.

325 *State Street*

New Surgical Techniques for Intraoral Cancer

G. C. FREEMAN, M.D., Honolulu

Summary and Conclusion

IRRADIATION therapy of cancer of the tongue and floor of the mouth has yielded a five-year cure rate of 25 per cent, or less. This accessible lesion should be diagnosed early by the performance of an adequate biopsy in all cases in which an ulcerating lesion of the mouth has been present for more than two or three weeks.

Operation Perfected

The composite operation, which includes resection of the primary lesion, the intervening lymphatics and the regional cervical lymph nodes, has been perfected in recent years. This more aggressive attack on intraoral malignant lesions, particularly of the tongue and floor of the mouth, offers considerable promise of improving the dismal results previously obtained, but it must be used in a larger series of cases and the patients must be followed for a longer period of time before final judgment can be made.

From *Postgraduate Medicine* **16**:538 (Dec.) 1954.

Complete UPPER DENTURE *Treatment in the Case of a Five-Year-Old Child: A Case History*

HARRY MAETH, D.D.S., Mosinee, Wisconsin

DIGEST

The patient in this case history was a child who presented, at the age of five, a situation of total and advanced caries. After complete extraction the patient was fitted with an upper denture to which she adjusted without difficulty.

Present Condition

When first seen, the patient, a girl five years of age was apparently well nourished, with a good complexion, and well-proportioned body. The facial features were normal; the head was well shaped.

Intraoral Examination

The tongue, lips, palate, floor of the mouth, and buccal mucosa appeared to be normal. All the maxillary teeth, and all the mandibular posterior teeth were in advanced carious and broken down conditions with no remaining crowns on any of them.

Past History

The patient was reported to have had "trench mouth" at the age of two years and the usual childhood diseases, "colds," measles, and chickenpox, between the ages of three and four years. There was no evidence of any disease at present, except advanced dental caries.

The parent stated that when the patient was four years of age she had been presented at three different dental offices but that no dental treatment was offered or given to this child. The parent was told that "the baby teeth will have to come out soon, so we won't do anything about them."

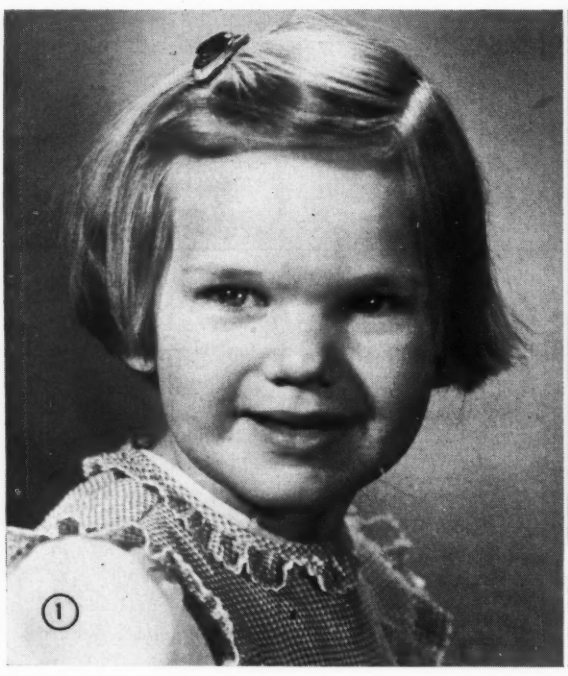
Treatment

Under local anesthesia, in hospital, all maxillary deciduous roots, and all mandibular posterior deciduous roots were removed. The bleeding was well controlled, and the healing of the operative field was uneventful. The patient was discharged the next day.

Conclusion

A complete upper denture was constructed for this young patient and inserted two months later. The patient became accustomed to the prosthesis without difficulty.

Mosinee, Wisconsin



1. *The patient is shown before the upper full denture was constructed.*

2. *Appearance of the patient with the denture inserted.*

A New Portable RESUSCITATOR *and* ANESTHETIC GAS MACHINE

JOHN W. CORCORAN, D.D.S.,
and ROBERT A. HINGSON, M.D., Cleveland, Ohio

DIGEST

This article describes a portable anesthesia machine that weighs only 17 ounces and is small enough to be held in one hand. Anesthesia has been produced with this machine without premedication in children and adults in from four to ten breaths. A complete description of the parts of the device and of the manifold uses to which it has been put, is given.

Varied Use of Machine

During the past year there has been under development and testing a portable, lightweight gas machine. Thus far it has found wide use (1) in various resuscitative maneuvers, (2) in the conduct of short anesthesias, including dental cases in children, and (3) for smooth induction in longer anesthesias.

Use as a Resuscitator—As a resuscitator the machine will find immediate use in the dental office. It has long been realized by conscientious practitioners that oxygen and a method for using it is needed in every dental operating room.

Infrequent Emergencies—Oxygen is a necessity for the treatment of syncope, apnea, aspiration of foreign objects, cardiac disease, convulsions, and drug sensitivity to local anesthetics. As these emergencies arise rather infrequently, it has been difficult to justify the expense of regular anesthesia machines and rentals on storage tanks. The machine described will fill this need of emergency oxygen, that can be delivered under positive pressure, at a cost of little more than a fire extinguisher.

Brief Anesthetic—The machine has made a pleasant, short anesthesia possible for the removal of teeth. Tests thus far have been conducted on both children and adults. The indications for its use have been (1) the cerebral palsied child, (2) the mentally deficient, (3) young children two to seven years of age, (4) in cases of acute maxillary abscess, (5) multiple extractions, (6) the overly apprehensive child, (7) adults with contraindications to conduction anesthesia in whom ambulatory treatment is undesirable, and (8) a means of providing anesthesia with full oxygenation requirements in both induction and emergence.

Anesthetic Agent Used—Cyclopropane in the following mixtures was the anesthetic agent used:

1. Cyclopropane 50 per cent—oxygen 50 per cent
2. Cyclopropane 30 per cent—oxygen 60 per cent—nitrogen 10 per cent
3. Cyclopropane 30 per cent—oxygen 30 per cent—helium 40 per cent
4. Cyclopropane 40 per cent—oxygen 30 per cent—helium 30 per cent

Experienced Operator Required—For successful use of the machine an experienced operator is required. Cyclopropane is a potent anesthetic agent and not a mere analgesic. A person administering the drug should be able to administer an anesthetic and to supervise a patient under the influence of that anesthetic; he should be able to recognize and treat obstruction of airway, depression or cessation of respiration, and an inadequacy of circulation. The incompatibility of cyclopropane and simultaneous or previous use of epinephrine in relation to inducing serious cardiac arrhythmias must be kept in mind.

Description

The machine (Fig. 1) has been used in the operating rooms of the University Hospitals of Cleveland since March, 1954, in the Western Reserve University Dental Research Clinic for Children since May, 1954, and more recently in the Cleveland City Hospital, McGill University, Notre Dame Hospital in Montreal, and in the Research Hospital of the University of Illinois. Its total weight is 17 ounces alone or 22 ounces with the filled 75-cubic centimeter Baralyme canister and gas cylinders. It can be held in one hand, and is capable of inducing anesthesia without premedication in children and adults in from four to ten breaths (15 to 45 seconds).

Component Parts—The device consists of the following parts:

1. A conductive rubber and transparent plastic face mask.
2. A central axial body of sparkproof aluminum with a compression spring valve that may be opened and closed with slight pressure, which opens the ports within the mask by sliding movement, permitting the exchange of respiratory gases within the unit.
3. A conductive rebreathing bag (6 liters, with 3-liter alternative).
4. Two right-arm aluminum containers to house the gas-filled cyl-

Authors' Note: The machine discussed in this article was developed in collaboration with Frank Zihorl and Arthur Kish, engineers of the Z. & W. Machine Products Company, Cleveland, Ohio.

inders. These containers with proximal threads attach to a brass threaded insert in the small central axial body. This central axial body has a specially designed perforating and sealing sliding mechanism for perforating the oxygen and anesthetic cylinders.

Color Identification: One of these side arm containers has an orange band of color to identify the anesthetic port and the other side arm container has a green band of color to designate the oxygen port.

Safety Device Incorporated: In order to prevent the inadvertent placement of two reservoirs of anesthetic gases into the machine simultaneously to the exclusion of oxygen, a safety device has been incorporated: the caps to the cyclopropane cylinders are reversed, causing the seal to be withdrawn deep into the neck of the cylinders. It thus requires a longer perforating tip to break the seal than is required for oxygen cylinders. It is therefore possible to use either two oxygen reservoirs in resuscitative maneuvers but only one anesthetic and one oxygen reservoir in any anesthesia induction.

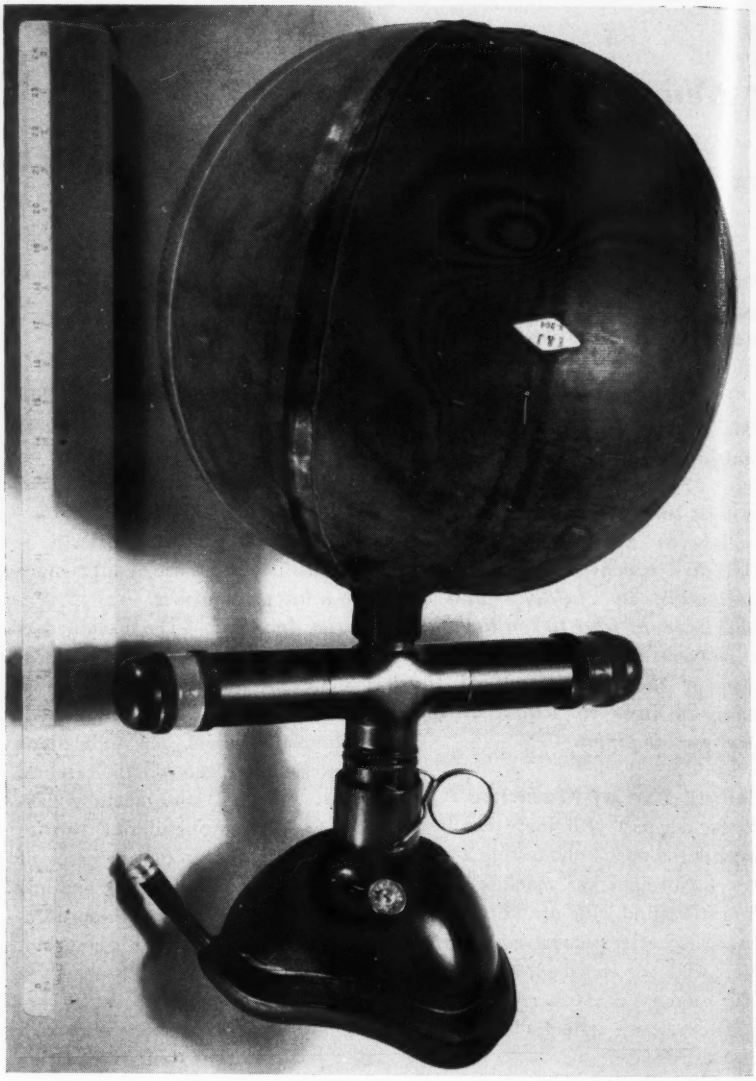
Gases Packaged in Reservoirs—The cylinders for use in the machine, tested for 4000 psi (pounds per square inch) burst pressure, contain oxygen or anesthetic gas under pressure. Thus far the following gases have been packaged in the cylinders:

Oxygen
Oxygen and helium
Cyclopropane
Cyclopropane plus nitrogen
Cyclopropane plus helium
Nitrous oxide

Perforated Seals—The seals on these cylinders are perforated by a specially designed mechanism previously described, after they are in position in the side-arm container:

1. The side-arm container is attached in position to the central axial body with a rotary movement by means of a thread.

2. The cylinder seals covering the compressed gases are cracked slowly in sequence by the perforating mechanisms which permit the gases to slowly fill the rebreathing bag.



1. ***Portable machine for administration of anesthetics and oxygen, with gas cylinders.***

3. The directional baffle of the central axial body shunts the gas flow into the bag. Slight counter-pressure opens the ports from the rebreathing bag to the mask and the patient.

Canister Provided—A transparent conductive canister for soda lime or Baralyme covered by a fine mesh conductive screen at both ends has been developed that can be used for to-and-fro respiration for removal of carbon dioxide, for longer procedures, or eliminated for short induction procedures and anesthesias requiring less than two minutes of rebreathing.

Alternative Port Cost-saving Mechanism—Reservoir or wall oxygen meeting the patient-minute-volume requirements may be added through a distal nipple port on the rebreathing bag. From 400 to 600 cubic centimeters of oxygen per minute are usually delivered to the adult patient. Since the oxygen cylinders are self-containing within the machine, it is possible for the machine to be used in short procedures without resorting

to a large reservoir supply of oxygen. The alternative port, however, is included in the machine as an operating cost-saving mechanism.

Mixture Recommended—After six minutes of breathing this mixture there will be more than 20 per cent oxygen and less than 20 per cent cyclopropane in the rebreathing bag. This initial 40-30-30 mixture is that recommended by the Mines Safety Commission of the Department of the Interior; the American Society of Anesthesia Explosion Committee under George Thomas, M.D.; and the Stipulations of Explosions, by Curtiss Hickcox, M.D., Secretary of the American Board of Anesthesia.

Experimental Results

Contrary to the results anticipated from experience with cyclopropane in the past in which inductions with 50-50 cyclopropane-oxygen mixtures with standard large anesthesia machines required one to four minutes for third stage, first or second plane surgical anesthesia, it was found that volunteers could be anesthetized with this machine to this same depth of anesthesia with four to ten respirations. These results were obtained in fifteen volunteers and subsequently confirmed by several inductions carried out in dogs in the experimental laboratory. The machine was first used in March, 1954, for inducing surgical anesthesia in a precipitating multipara. Induction was obtained with three breaths.

Oral Surgery in Children—Up to the present time 555 inductions have been effected without major complication. From four to fifteen breaths of the cyclopropane-oxygen mixture are required for induction. For maintenance this is followed by the drop ether sequence, or by a vinethene intermediary plus the drop ether sequence. The use of the machine has considerably shortened the induction time, thereby reducing secretions, and has eliminated many of the apprehensive psychologic reactions of the children which are experienced by them with the use of the open drop mask.

Use in Children's Dentistry—In May 1954 the machine was introduced into the Western Reserve University Dental Research Clinic for Children. It gave results far above the original expectation for this use.

Preparation: No premedication is given to the children, but they are thoroughly examined by the pediatric staff for cardiac irregularities and acute respiratory and ear infections. The child has been examined at a previous appointment for the teeth to be removed. He is seated in the conventional dental chair. An attempt is made to put the child at ease, then in a casual manner he is introduced to the machine.

Method of Use: The child is invited to blow into the "funnel" mask to inflate the rebreathing bag. Thus introduced, the anesthetist breaks the oxygen seal, allowing the bag to half fill, and then introduces the cyclopropane into the system. The following measures are then taken:

1. The anesthetist carefully places the mask on the patient's face and immediately opens the valve to the rebreathing bag to allow the patient to breathe the mixture. After five to ten breaths there is usually a short period of apnea. It is believed that the momentarily primary high blood concentration of cyclopropane depresses the respiratory center of the brain to this point.

2. The mask is held firmly to the face and after 15 to 20 seconds the breathing will be resumed. The blood has been desaturated of cyclopropane by the body tissues. Signs of anesthesia are observed and the amount of additional anesthesia is somewhat determined by the number of teeth to be removed. Twenty-five breaths will usually suffice for four minutes of anesthesia time.

3. The whole apparatus is put aside, the mouth gag is placed (the anesthetist supports the mouth gag

Table 1.

Gas	*Volume in cubic centimeters*	*Color of Cylinders*
1. Free volume oxygen	1639.3 cubic centimeters	Green
2. Free volume cyclopropane	1630.3 " "	Orange
3. Cyclopropane plus nitrogen	814.6 " "	Orange and
	100.0 " "	black
4. Nitrous oxide	4917.9 to	Blue
	2400.0 " "	
5. Cyclopropane	2200.0 " "	Orange with
Helium	1050.0 " "	brown band
6. Oxygen	1500 to	Green with
	1800.0 " "	brown band
Helium	350 to	
	500 " "	

Table One

The total volume of free gas under standard conditions which has been stored in the cylinders is shown in Table 1.

Colors Used—The standard colors have been used as recommended by the Bureau of Mine Safety in the Department of the Interior, and the American Society of Anesthesiologists. The exteriors of the thumb-sized gas cylinders are painted in the following colors:

(a) Green for oxygen

(b) Orange for cyclopropane

(c) Orange and black for cyclopropane and nitrogen

(d) Blue for nitrous oxide

Contents of Rebreathing Bag—By combining cylinders Number 5 and 6 in Table 1, the following nonflammable mixture is obtained in the rebreathing bag:

Cyclopropane	40 per cent
Helium	30 per cent
Oxygen	30 per cent

Serial sampling of the reservoir bag each ten breaths reveals that the remaining mixture for the next six minutes stays outside the explosive range.

Table 2 ANESTHESIA STUD

Case No.	DATE	AGE	RACE	SEX	RESP.	PULSE Before	PULSE During	PULSE After 5 Min.	Pre-medication	Breaths to Prim. Apnea	Total Breaths	Mix-tu
1	5-13-54	6	—	F	20	111	120	—	0	—	10	50-5
2	"	5	W	F	23	92	92	—	0	—	15	33
3	"	13	—	F	—	—	—	—	0	—	12	33
4	"	5	W	M	—	—	—	—	0	—	15	33
5	"	8	—	M	20	111	112	—	0	6	8	—
6	9-2-54	10	W	F		100	108	88	0	No	20	50-5
7	"	10	W	F		100	88	140	0	10	20	50-5
8	"	10	W	F		100	72	—	0	7	15	50-5
9	"	6	W	M		96	88	94	0	No	20	50-5
10	"	6	N	M		100	88	100	0	No	20	33
11	"	9	W	M		96	100	96	0	8	12	50-5
12	"	5	N	F		120	110	100	0	8	12	33
13	"	4	N	F		140	108	112	0	9	20	33
14	"	4	W	F		90	120	120	0	14	25	33
15	"	6	N	F		100	140	100	0	No	19	50-5
16	"	11	W	M		96	90	—	0	10	10	50-5
17	9-16-54	13	W	F	24	96	90	100	0	8	23	50-5
18	"	8	W	M	24	112	120	120	0	12	25	50-5
19	"	8	W	M	14	84	100	100	0	6	20	50-5
20	"	4	N	M	18	100	100	—	0	6	17	33
21	"	3	N	F	24	112	110	130	0	—	30	33
22	"	10	W	M	20	80	110	88	0	4	20	50-5
23	"	5	N	F	30	116	100	110	0	—	7	50-5
24	"	5	N	F	20	100	90	94	0	8	20	50-5
25	"	8	W	F	20	75	100	90	0	5	14	50-5

**Residual cyclopropane from first anesthesia—26 breaths, enough for three teeth. Reanesthetized with 50-50 solution for two extra teeth. NOTE: No cardiac irregularities in this series.*

while also maintaining the airway), a gauze pack is placed in the throat by the surgeon and the offending teeth are removed. As many as twelve teeth have been removed in this manner.

4. Should the anesthesia not be long enough, the operation can be halted momentarily to deepen the anesthesia. A nasal piece has been developed as an aid for prolonging anesthesia.

5. The patient has a rapid recovery, and is able to ambulate in three to four minutes after surgery is completed. At this writing 109 cases have been satisfactorily completed. Data from the first 25 cases are shown in Table 2.

Adult General Surgery—The device has been used for inducing anesthesia in 120 additional cases in adult surgery including two to 15 dental extractions each in 21 adults. In two of these patients there were delirium and marked excitement stages with a 33 per cent by volume cyclopropane mixture, and in another patient with a 50 per cent by volume cyclopropane mixture. The latter patient, however, had a poorly fitting mask.

Emergence Delirium—There were two incidents of emergence delirium requiring restraints for ten minutes. For short, five to 10-minute operations, this machine has been used with cyclopropane and wall oxygen for anesthesia.

Resuscitation—By adding an Oxford type corrugated bellows rebreathing bag, the instrument becomes a simpler and virtually as effective a ventilator as the Kreiselman resuscitator. In addition, it has the advantage of portable oxygen for field and emergency hospital use.

Cyclopropane

In common with all anesthetic agents, cyclopropane has some disadvantages, but also many advantages.

Properties of Agent—Cyclopropane is a nonirritating, colorless gas with a sweet odor and taste. The molecular weight is 42.05, with a specific gravity of 1.46 as compared with that of air, 1.0 specific gravity. It liquefies at 5 atmospheres pressure at room temperature. The boiling point is -34 Centigrade (-29.2 Fahrenheit). Avoirdupois is equal to 4.30 gallons. Cyclopropane is sometimes called trimethylene. It is a saturated, cyclic hydrocarbon with a formula of C_3H_6.

Anesthetic Concentrations — The anesthetic concentrations of cyclopropane in the blood are the following:

		Volumes per cent
Stage III	Plane 1	7.3
	Plane 2	13.0
	Plane 3	23.0
Stage IV		42.0

Advantages—The chief advantages of cyclopropane are (1) it possesses a wide margin of anesthetic safety, (2)

Vomiting	No. Teeth Extracted	Laryngeal Spasm	Min. of Anes.	Soda Lime	Apnea	Cyanosis	Increa. Mucus	Minutes to Ambulation	Other Complications	Controlled Breathing Nec.	Cry Before	Cry After
No	1	No	5	No	—	No	No	5	No	No	—	—
No	—	No	2	No	—	No	—	—	No	No	—	Yes
—	2	No	—	No	—	No	—	10	Cough Ind.	No	—	—
—	4	No	5	No	—	No	—	—	—	No	—	Yes
No	2	No	4	No	Yes	No	—	6	No	No	—	No
No	1	No	5	No	No	No	No	7	No	No	Yes	Yes
No	4	Strid.	6	No	Yes	No	No	6	No	No	No	No
No	5	No	4	No	Yes	No	No	7	No	4 Br.	Yes	—
Yes	2	No	3	No	No	No	No	6	No	No	No	Yes
No	4	Strid.	3	No	No	No	Yes	6	Cough	No	No	Yes
Yes	1	No	2½	No	Yes	No	No	8	No	No	No	No
No	2	No	2	No	Yes	No	No	7	No	No	No	Yes
No	2	No	1½	No	Yes	No	No	5	No	No	No	Yes
No	5	No	1½	No	Yes	No	No	7	No	No	No	Yes
No	2	No	4	No	No	No	No	7	No	No	No	No
No	1	No	2¼	No	Yes	No	No	6	No	No	No	No
No	12	No	3½	Yes	Yes	No	No	8	No	No	No	Yes
No	3	No	4	Yes	Yes	No	No	7	No	No	No	Yes
No	7	No	3	Yes	Yes	No	No	6	Arm Wave	No	No	No
No	2	No	3	Yes	Yes	No	Yes	6	Cough	No	No	No
No	5	No	2	Yes	No	No	No	6	No	No	No	No
Yes	5	Strid.	2	Yes	Yes	Sl.	No	5	No	No	No	Yes
No	3	No	2	Yes	No	No	No	6	No	No	No	No
No	4	No	1½	Yes	Yes	No	No	7	No	No	No	Yes
No	4	No	3	Yes	Yes	No	No	9	No	No	No	No

induction is pleasant and rapid, with a minimum of salivation or bothersome secretions, (3) respiration is quiet, (4) it does not significantly disturb metabolic processes, and (5) recovery is extremely rapid.

Disadvantages—The chief disadvantage is that it is highly inflammable with a flash point below 0° Centigrade (32.0° Fahrenheit). It has been found that helium greatly dampens the inflammability of the gas. The suggested mixture is theoretically sparkproof. Preliminary laboratory testing has verified this postulate in 30 tests.

Physical Effects—1. There are no histologic changes characteristic of the drug occurring in any organ of the body, including the heart. There is, however, in the deeper planes of anesthesia and in prolonged anesthesia, an increased irritability of cardiac autonomic tissue predisposing to arrhythmias. This is probably due to a reflex system from mesentery to hypothalamus to heart, as well as to an epinephrine release antagonism.

2. Bradycardia is not uncommon in cyclopropane anesthesia, although it has not been a complicating factor in the short dental anesthesias. Slowing of the pulse to 60 or less is a warning of possible overdosage.

3. One note of caution is that epinephrine should never be given to a patient under cyclopropane anesthesia, as it may produce a ventricular fibrillation.

4. Stridor and laryngeal spasms have been reported frequently while using cyclopropane. No severe complication has arisen from this problem in the dental cases completed. One patient was given assisted respiration with the machine, using 100 per cent oxygen.

Possible Uses

The following are some of the possible uses of this machine in modern clinical anesthesia, resuscitation, and oxygen inhalation therapy:

1. For use in short five to ten-minute anesthesias where quick return to consciousness is desirable:

(a) In forward positions on the battlefield, in mine explosions and minor blast disasters, a portable device or devices such as this could be dropped from aircraft without damage to the apparatus.

(b) In dental anesthesia for simple extractions.

(c) In hospital emergency rooms this device becomes an auxiliary gas machine for use in reduction of dislocations and for quick anesthesia to assist in the control of sudden and severe hemorrhage.

2. For use as a portable ventilation apparatus with oxygen for rebreathing carbon dioxide as therapy for atelectasis and postanesthesia hypoventilation. Sixteen successful applications in this field have been completed.

3. As a mechanical resuscitator for use on the battlefield, in industry, by first aid corpsmen and physicians, and by firemen and policemen in suf-

focation accidents from fire or suicidal inhalation.

4. For use by first aid rescue squads in drowning accidents and in mine explosions.

5. The device can be used by passengers of planes at high altitudes, hooked to a central manifold valve to a common source of oxygen supply, and by paratroopers during descent through hypoxic atmospheres.

6. For use in pediatric anesthesia as an induction apparatus preliminary to open drop anesthesia, thereby removing the emotional hazard of the larger and more frightful machines.

7. For use by cardiac patients in offices and homes as an easily maneuverable device much superior to present ones and much more economical.

Additional Advantages

1. The device with 50-50 mixtures of cyclopropane-oxygen reduces the explosion potential 240 times purely on the basis of the mathematical reduction of explosive molecules. On the basis of our calculations of the Bureau of Mines, it is believed that an explosion within this device can be prevented by using the recommended helium-cyclopropane-oxygen mixtures as described.

2. The cost of such a small device would be many times less than that of the present gas machines.

3. Portability.

4. Easy maneuverability, with the use of calculated sublethal doses to which there could be no augmentation by mechanical defect or human error, now possible with standard machines. Second and sequential individual dose cylinders could be added, however, for prolonged and augmented anesthesia.

Summary and Conclusions

A new midget model anesthetic gas machine and resuscitator has been developed at Western Reserve University Hospitals in Cleveland. To date more than 2,000 persons have been managed by this machine without major complications in the previously designated categories.

Application of Machine—The assay of merit of this machine should be classified in two categories (1) that of resuscitation and rescue work with 100 per cent oxygen, and (2) that of the induction and administration of anesthesia. Obviously, the first category, resuscitation, presents no danger and a great many safety factors are provided by this compact unit.

Category of Anesthesia—The dangers inherent in the administration of every anesthetic are present. The additional hazards of explosion, while reduced from those with standard machines and larger volumes of explosive gases and longer anesthesias, are apparent. The principles of sound and conservative medicine, anesthesiology, and pneumotology must be followed in further uses of this flexible apparatus.

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[1]Adriani, John: Pharmacology of Anesthetic Drugs, ed. 3, Springfield, Illinois, Charles C Thomas, Publisher, 1952.

Use of Calcium Hydroxide as a Pulp Capping Material

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Summary and Conclusions

Of 225 teeth treated with calcium hydroxide as a pulp-capping material, 52 were available for clinical and radiographic observation for from 30 to 120 days. As an aid in control and evaluation, only oxyphosphate of zinc cement was used as a filling or filling base in these teeth, and no sterilizing drugs, zinc oxide, or eugenol were used in treatment. Of the 52 teeth treated, the results in 50 were considered to be clinically successful; two teeth gave radiographic evidence of a periapical abscess. Although the prognosis was undetermined or poor in 25 teeth the results in all but one were clinically successful; the second failure occurred in a tooth with a good prognosis.

These findings indicate that the use of sterilizing drugs, zinc oxide, and eugenol is not essential in the treatment of exposed pulp, and that the use of calcium hydroxide is adequate, resulting in rapid healing of pulpal tissue in the young tooth.

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A Biologic Approach to CLASP PARTIAL DENTURES

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DIGEST

Clasp partial dentures have been described as devices for the slow, painless, expensive extraction of teeth.[1] Unfortunately, this is true of many partial dentures. If a few basic principles are observed, however, in the preparation of the mouth and the construction of the denture entirely different results will be obtained: (1) usefulness of the remaining teeth will be prolonged and their masticating efficiency increased, (2) the partial denture will aid in maintaining the health of the mouth and will become part of the masticating apparatus without undue discomfort, and (3) the esthetic requirements of the patient will be satisfied.[2] This article gives detailed instructions for the construction of a clasp partial denture including a discussion of the roles of diagnostic x-rays, mouth preparation, and surveying and designing as important aspects of the technique.

Factors in Preventive Dentistry

As preventive dentistry develops, especially in the field of periodontia, the clasp partial denture will become more and more important. In the armed forces today there are many more partial dentures constructed than full dentures. If definite principles are followed in its planning and construction, the clasp partial denture can be an excellent restoration and of value in dental treatment.[3]

Consequences of Faulty Occlusion—Where occlusion has been lost, the remaining teeth may be under excess stress with the following results:

(1) Those teeth next to an edentulous space will tend to migrate toward that space.

(2) The teeth opposite an edentulous area may either extrude or exfoliate.

(3) Contact points are broken and food impaction occurs.

(4) If the missing teeth are not replaced the process will continue until the entire dental arch has deteriorated.

Functional Advantages—(1) With the restoration of occlusion, the remaining teeth, because they are restored to function, will be better preserved.

(2) The appliance will enable the patient to eat with greater satisfaction. The patient's appearance will be restored and his mental outlook will be improved.[4]

Problems in X-ray Diagnosis

The usefulness and permanency of a partial denture is affected by the condition of its support; the biologic aspects of this treatment must therefore be considered. In the study of this phase of the problem roentgenograms are useful. A detailed description of all the factors that might be studied in an x-ray evaluation of a patient for partial dentures is not within the scope of this article. Some diagnostic considerations that are occasionally overlooked are discussed.

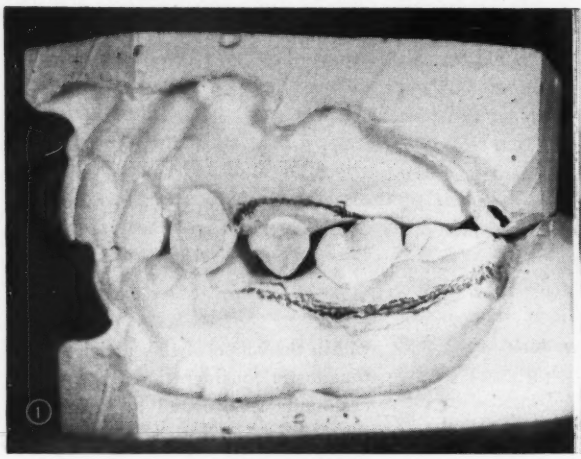
Variation in Structure Revealed—Roentgenograms show wide variation in the cancellous structure of bone. Some is dense, hypercalcemic with heavy trabeculae and small intratrabecular spaces. Little resorptive changes might be expected.[5] This is not always true. Other films may show loose honey-comb hypocalcemic structure with thin trabeculae and large intratrabecular spaces. This could lead to the belief that there would be a greater degree of resorption. This may not be true.

Explanation—In the first instance the tissue might be receiving sufficient stimulation and a partial denture might overstimulate it. In the second case the patient may have worn a fixed appliance for some time. The protection the edentulous area received from the fixed appliance would result in a lack of stimulation, and consequently less than normal bone density.

Stimulation Supplied—Bone is a reactive substance. If hypocalcemic appearing bone is the result of lack of stimulation, when the bone receives the stimulation from a partial denture there may be less rapid resorption than was expected.

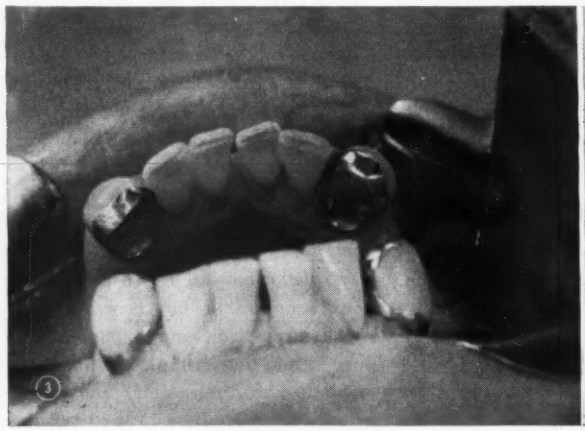
Technical Features—There are also several technical conditions that may be misleading in interpretation of x-rays. The density of the films and the apparent density of the bone will vary because of the angulation of the tube, the duration of the exposure, and the processing time. X-ray density of bone is variable and is not entirely dependable as a criterion upon

[1]Tench, R. W.: Fundamentals of Partial Denture Design, JADA **23**:1087-1092 (June) 1936.
[2]Elliott, F. C.: Practical Partial Dentures of the Removable Type, JADA **22**:614-618 (April) 1935.
[3]Steffel, V. L.: Simplified Clasp Partial Denture Design for Maximum Function, JADA **32**:1093-1100 (Sept.) 1945.
[4]Collett, H. A.: Principles of Partial Denture Design, DENTAL DIGEST **57**:24-29 (Jan.) 1951.
[5]Applegate, O. C.: Cast Saddle Partial Dentures, JADA **24**:1280-1291 (Aug.) 1937.

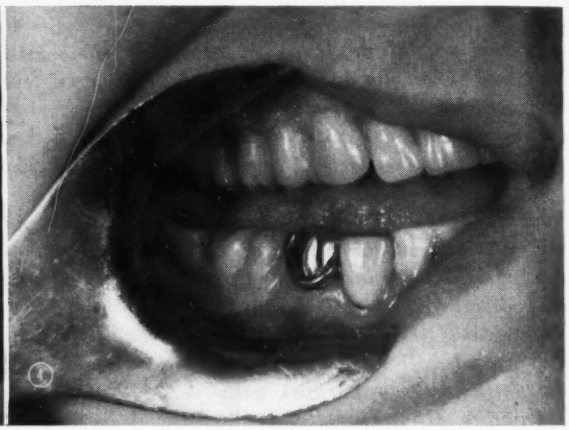


1. *When teeth have been allowed to extrude beyond correctional limits surgical preparation is necessary.*

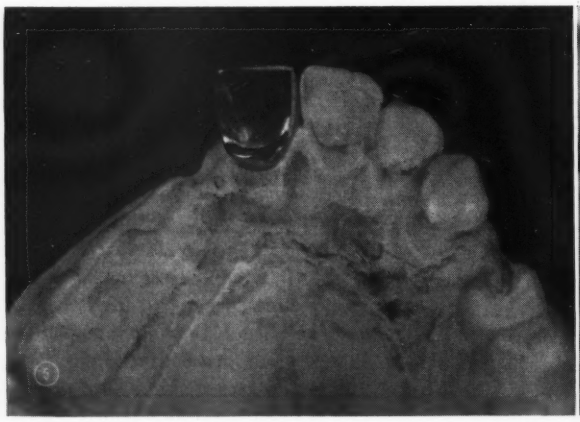
2. *When esthetics is an important consideration the contour of anterior teeth might be modified with porcelain inlays for better clasp retention.*



3. *The plastic or porcelain veneer crown lends itself well to the preparation of the mouth for partial dentures. It can be contoured for retention and support and is an esthetic restoration. It will also protect susceptible teeth from caries and erosion.*

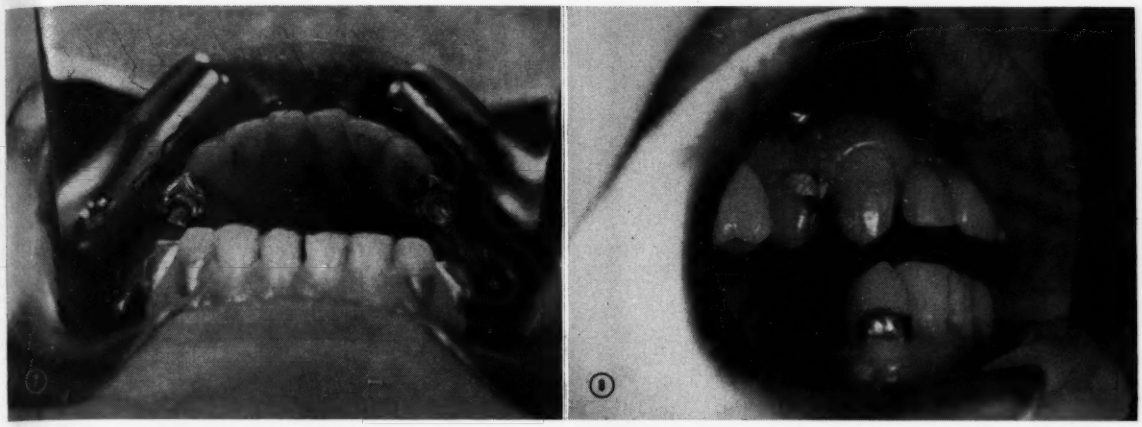


4. *Partial dentures may be more adequately braced by splinting the abutment teeth. Here a bicuspid has been splinted to a cuspid by soldering the contact points of a cast gold bicuspid crown to the contact point of a plastic veneer crown. This preparation gives the strength of a multirooted tooth.*



5. *An exaggerated cingulum on a full or three-quarter crown makes an excellent support for vertical occlusal stresses.*

6. *Lingual inlays offer an excellent method of transmitting the vertical occlusal stresses with the long axis of the supporting teeth. Spoon-shaped indentations in these inlays allow for the pump handle action of distal extension saddles, which takes place because of tissue resilience.*



7. ***Full coverage of posterior abutment teeth offers many advantages. The teeth to be clasped are protected from caries and erosion and they may be contoured for the most satisfactory retention, bracing, and support of the dentures. The perparation for the rest can be made deep enough so that the rest can be sufficiently strong and still not interfere with the occlusion. The rest can be extended well into the center of the occlusal surface of the tooth to transmit the vertical occlusal forces with the long axis.***

8. ***An amalgam restoration can be used for an inexpensive preparation to obtain sufficient retention when the natural contour of the tooth does not present retaining undercuts. A notch cut in the distal aspect of the incisal edge is an inexpensive preparation for support of a partial denture against vertical loading.***

which to base a proper prognosis.[6]

Conditions Determined from X-rays—Special attention can be given to the alveolar process around the teeth which have sustained greater stress than other teeth in the same dental arch. This excess stress could be from traumatic conditions, or excess loading. If the response has been favorable, it is quite probable that the response to future loading will be favorable.[6]

Mouth Preparation

Diagnostic Casts Important Aids—Necessary steps[5] in the preparation of the mouth, (1) extractions (Fig. 1), (2) removal of superfluous tissue, (3) possible reduction or reshaping of the bony ridge, and (4) various operative procedures can more accurately be determined from casts.

Preservation of Favorable Conditions—Diagnostic casts will show the need for changes in the contour of abutment teeth to provide retention. An abutment tooth without modification might offer no retention against vertical displacement. The retaining undercuts of unmodified teeth may be located in areas which would require a clasp design that would not offer sufficient bracing against horizontal forces. It seems better to determine the design of a denture that is best for the preservation of the remaining tissues in the patient's mouth, and to modify the contours of the abutment and supporting teeth for this design than to design a denture to fit an existing unfavorable condition (Figs. 2, 3, 4, 5, 6, 7, and 8).

Alterations in Tooth Contour—Some difficulties are involved in changing the contour of teeth:

1. If teeth are undercontoured they may not provide sufficient protection to the free margin of the gum. This could result in periodontal disease.

2. If the teeth are overcontoured, they may overprotect the free margin of the gum, and prevent sufficient stimulation. This also could result in periodontal disease.

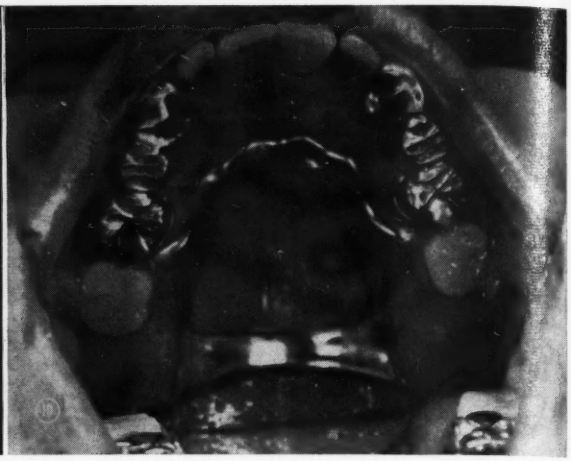
Occlusal Modification—Diagnostic casts will show modifications necessary in the occlusion and suggest possible methods for this important correction. (1) The possibilities of correcting extruded teeth by grinding, (2) the repositioning of teeth that have migrated or changed their axial positions by orthodontic measures can be considered, and (3) the harmony of the replacement occlusion with the opposing natural occlusion can be observed to advantage on diagnostic casts. Cusps too high might magnify damaging horizontal forces. Possible reduction of cusp height in these cases should be studied.

Restoration of Centric Relation—Because of occlusal wear or deterioration of the occlusion, centric relation and centric oclusion may not be in harmony. If not corrected, this condition will establish damaging horizontal forces when the patient attempts to close in centric. Plans for the correction of this condition may be worked out on mounted diagnostic casts.

Balanced Occlusion Important—Although balanced occlusion is extremely important, it is difficult to obtain with partial dentures. If balance does not exist, however, there may be perfect occlusion in centric while damaging horizontal forces are established whenever the patient attempts to move to an eccentric position.[7] Balance of the occlusion of the natural teeth and the denture teeth should be developed at the same time.

Placement of the Denture Teeth—Occlusal surfaces located beyond foundational bounds create leverages that are destructive to the supporting structures.[8]

[6]Applegate, O. C.: Keeping the Partial Denture in Harmony with Biologic Limitations, JADA **43**:409-419 (Oct.) 1951.
[7]Collett, H. A.: Balancing the Occlusion for Partial Dentures, JADA **42**:162-168 (Feb.) 1951.
[8]Schuyler, C. H.: Partial Denture as a Means of Stabilizing Abutment Teeth, JADA **28**:1121-1125 (July) 1941.



9. ***When only a few teeth remain it is well to cover the entire palate to secure maximum support from the soft tissue. This will also help to prepare the patient for complete dentures should they become necessary. Distributing the stress among all the remaining teeth is desirable in this type of case. This can be done with a lingual plate if the occlusion permits. The part of the lingual plate resting on the teeth should be constructed of metal. Reproduction of this part of the plate in plastic is not accurate because of dimensional changes that take place when this material is processed. An inaccurately constructed plastic lingual plate would have a tendency to wedge the teeth on which it rested. Plastic also has a tendency to wear with use.***

This denture gets part of its vertical support from lingual inlays with indentations on the cuspids as shown in Figure 6.

10. ***It is not necessary to replace all the missing teeth on the same appliance. Here the first bicuspids have been replaced with fixed bridges. The same fixed bridges have been used for support of a removable clasp partial denture. Two connectors have been used on this appliance. Each connector is in a different plane of the palate. This offers more resistance to occlusal stresses. The anterior connector acts as an indirect retainer because it extends anterior to the fulcrum line (an imaginary line drawn through the rests). The stresses of the removable appliance are distributed through the fixed appliances, which in effect splint the second bicuspids with the cuspids to give the strength of multirooted teeth.***

Tissue Tolerance

Tissue Tolerance Varies—Physiologic tissue tolerance varies considerably in patients. For this reason the stress loads of the partial denture should be directed toward the minimal in order not to exceed the limit of individual tolerance.[6] There is seldom danger of understimulating the tissues with clasp partial dentures. The danger is in overstimulation.[8]

Adaptive Capacity of Bone—The systemic regulation of bone controls its capacity of adaptation to functional demands. (1) Age, (2) malnutrition, (3) endocrine disturbances, and (4) systemic disease inhibit the individual metabolic capacity of the bone and therefore favor atrophic changes. The systemic regulation determines the adaptive capacity of bone to increased functional demands.[9]

Surveying and Design

It is impossible for the human eye to determine all the undercut areas in relation to each other; a surveyor is therefore necessary in planning a design. There are three considerations in the selective theory of surveying: (1) esthetics, (2) interference, and (3) retention.

Advantages in Surveying—1. The surveyor aids in determining the path of insertion of the denture and discloses the height of tooth and tissue contour.

2. When a case is properly surveyed the clasps will function in correct relation to each other and excessive retention will be avoided.

Results of Excessive Retention—With excessive retention there is a destructive traction on the supporting teeth when the appliance is removed.[10] Clasps are strained nearer to their elastic limit and fewer flexures are required to cause failure.

Changes in Contour Planned—During the surveying process the desirable change in the contour of the abutment teeth is determined.

Direct Retention—The ringlet type of clasp presents many advantages. In addition to offering adequate retention it is especially useful in bracing against horizontal forces. Difficulties may develop if the clasp is not properly designed. Many abutment teeth are lost from torque produced by cast ringlets that lacked sufficient resilience. If these clasps are too rigid they will not allow for the "pumphandle" action of free-end saddles. The retaining ends of ringlet clasps should be tapered and resilient.

Support—The following are some of the uses of rests:

1. Rests support the denture against vertical forces that tend to move the denture toward the supporting structures.

2. They prevent the concentration of occlusal forces on the edentulous areas.

3. They keep the clasp terminal in its proper position on the tooth and

[9]Glickman, I.: The Periodontal Structure and Removable Partial Denture Prosthesis, JADA **37**:211-316 (Sept.) 1948.

[10]Applegate, O. C.: Use of the Paralleling Surveyor in Modern Partial Denture Construction, JADA **27**:1397-1407 (Sept.) 1940.

prevent both clasp and saddle impingement on the gingiva. Every tooth next to an edentulous area should carry a rest.

Preparation of Posterior Teeth for Rests—Enough enamel should be removed so that the rest will be sufficiently strong without interfering with the occlusion. The rest should extend well into the sulcus so that the vertical stresses will be transmitted with the long axis of the supporting tooth (Figs. 7 and 10).

Preparation of Anterior Teeth for Rests—Preparation for the use of rests with posterior teeth is desirable, but preparation of anterior teeth for rests is necessary (Fig. 5, 6, and 8). When lingual rests are used on anterior teeth without proper preparation the vertical occlusal forces are translated into horizontal forces which are considerably greater than the original vertical forces. Anterior teeth are not able to resist these damaging horizontal forces for long. The proper preparation of anterior teeth to support partial dentures is one of the most neglected phases in restorative dentistry.

Indirect Retention—Indirect retention is necessary because a clasp retains only the end of the saddle to which it is attached. To keep the free end of a distal extension partial denture in place it is necessary to have support forward of the fulcrum line. This can be in the nature of (1) a continuous lingual plate (Fig. 9), (2) an extension arm, or (3) an anterior connector (Fig. 10). The extension arm seems less desirable for this purpose than some of the other devices. Some indirect retainers serve the additional function of stress distribution. For this reason the lingual plate and the continuous lingual rest seem most desirable. The aim in partial denture design should be stress distribution. Stress concentration should be avoided.

Saddles—Saddles act as vertical supports when the denture is partly tissue borne. They also help to brace against horizontal forces if properly extended. They should be large and take advantage of all the tissue area possible to give a "snow shoe" effect (Fig. 9).

Plastic or Metal Used: Saddles may be constructed of plastic or metal. Advantages and disadvantages are to be found in each. Plastic is easier to rebase and more economical. It is also lighter in weight. If lower distal extension cases are constructed of plastic it is less difficult to take full advantage of buccal extension. Metal saddles, if overextended in this area, would be more difficult to adjust.

Use of Metal Saddles: Metal saddles permit the minimum of bulk with the maximum of strength. Greater accuracy is obtained because metal does not undergo as much volumetric change when it is processed. The tissue under a metal saddle is better stimulated because of the high thermal conductivity. It allows tissue heat to be disseminated as well as the transmission of heat to the tissues. Plastic is an insulator and acts as a rubber glove retaining the heat.

Connectors—Saddles must be united and stabilized. This is accomplished by the use of connectors. Connectors should be heavy enough to ensure rigidity. There is a tendency for dentures to flex under occlusal stress.[11] Flexing can be extremely destructive to the supporting structures of partial dentures and should be kept at a minimum by the use of rigid connectors. Palatal connectors should be double and each should be located in a different plane of the palate (Fig. 10).

[11]Regli, C. P., and Kydd, W. L.: A Preliminary Study of the Lateral Deformities of Metal Base Dentures in Relation to Plastic Base Dentures, J. Pros. Dent. **3**:326-330 (May) 1953.

Servicing

Because of their nature removable partial dentures require more servicing than other types of restorations. There is greater danger of damage to the restoration and the remaining natural teeth. Their more complicated construction increases the possibility of breakage and distortion. Tissue changes alter occlusal relations and the relations of the denture attachments to the natural teeth.

Summary

X-ray studies are valuable adjuncts in the diagnosis and prognosis of partial dentures. Improper interpretation, however, can be misleading. Diagnostic casts are extremely valuable in planning, preparation, and designing of partial dentures. Properly planned and constructed clasp partial dentures should be considered preventive appliances that will aid in the retention of the remaining structures. Clasp partial dentures because of their construction require more servicing than other types of restorations.

USN *Dental Clinic*
205 *Park Avenue*

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Simplified Technique

for FULL DENTURE IMPRESSIONS

LEO B. DILLON, D.D.S., Birmingham, Alabama

DIGEST

The technique for impressions of full dentures described in this article is a combination of techniques that the author has demonstrated in his practice. The technique is not intended to be used for immediate dentures but after the maximum amount of tissue resorption has occurred after the extraction of teeth, or for new dentures to replace old ones. The steps necessary to obtain excellent final impressions of both edentulous jaws are presented in detail and illustrated.

Essential Factors in Successful Technique

Ideal oral conditions involving arches, ridges, vault depth, muscle attachments, dimensions, condition of the tissues are seldom present. The knowledge of how to cope with unfavorable conditions is therefore essential to attain satisfactory results in full denture impressions.

Case History

In the development of an individual and successful technique the first step to be taken is that of obtaining a complete history of the patient's denture experience. The patient may be encouraged to talk by judicious questioning. Was his present denture at one time satisfactory? Under what circumstances did he lose his natural teeth? It is important to determine all the factors that might have a bearing upon his present condition: Psychologic, physical, and the present condition of his mouth.

Mental Attitude — The patient's mental attitude should be classified as hysterical, exacting or hypercritical, indifferent, and philosophic. Knowledge of his mental attitude will in some measure aid in evaluating his complaint. After a careful evaluation of all these factors the patient can be tactfully told what the proposed treatment plan is to be.

Oral Conditions—Conditions in the patient's mouth determine the selection of the impression technique or modification of the technique of choice. No one impression technique is suitable to all mouth conditions. The technique described in this article can, however, be applied in a large number of full denture patients and with slight modifications can be used in almost all of them.

Oral Examination

Examine the mouth carefully, noting particularly the dimensions:

1. The distance from the midanterior ridge to the border of soft and hard palate. Is this of greater distance than the lateral measurement from one tuberosity to the other? The most favorable dimension is the anterior-posterior dimension.

2. The length of the ridge and its density (firmness or flabbiness) and the location of the muscle attachments (highness or lowness).

3. The depth of the vault and its lateral measurements.

4. By careful digital examination and observation locate the hard areas (the tori spines), and soft areas (placable tissues, movable tuberosities).

5. Locate anatomic landmarks such as the hamular notch, foramina, postdam area, mucobuccal fold, and frenula.

Digital Examination—1. Feel the retromolar pad. Locate the internal and external oblique line.

2. Place the index finger just back and lingual to the retromolar triangle; have the patient extend the tongue in order to classify the lateral throat form and to locate the posterior lingual margin of the lower denture.

3. Search for bony nodules in the molar bicuspid area.

4. Look for hard, bony areas in the anterior region just back of the ridge.

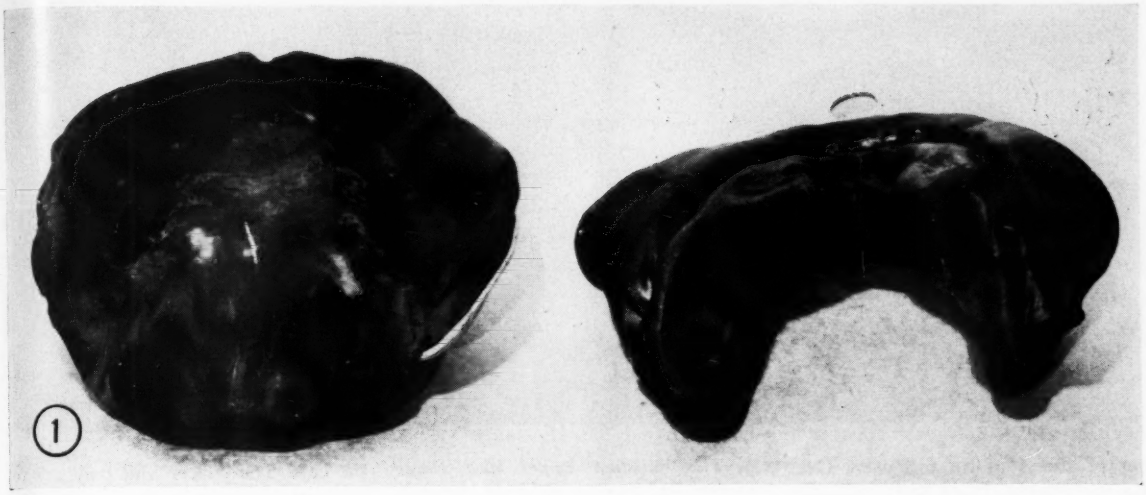
5. Note the condition of the lower ridge (rounded, firm, soft, or knife edged; inclination straight or lingual).

6. Locate the muscle attachments on the buccal or labial side; also on the lingual side.

Surgery May be Necessary—If conditions can be corrected or improved by surgery in either upper or lower jaw, urge the patient to have it done.

Preliminary Impressions

The impression tray for the preliminary impression of the upper edentulous jaw should be oversized enough to allow for a thickness of from $\frac{1}{4}$ to $\frac{1}{8}$ an inch of the impression material on the labial and buccal aspects. Anteroposteriorly it should extend slightly behind the juncture of the hard and soft palate. The sides of the tray should extend upward almost to the mucobuccal fold from the incisor region to the region of the tuberosities. The material most often used for the preliminary impression is modeling compound; however, if the condition of the ridge is such that less pressure is



1. ***Preliminary modeling compound impressions of the upper and lower. Note the extension at the junction of the soft and hard palate and how accurately the impression shows the mucobuccal fold. On the lower, notice the small ridge and the overextension in all directions without the tray appearing at any point.***

desired than is possible with modeling compound, other material, such as the alginates, can be used.

Procedural Steps—1. When modeling compound is used, the following steps may be taken:

1. Place the patient in the chair in an almost upright position.

2. Fill the previously fitted tray with modeling compound, softened with moist heat to the correct consistency.

3. Center the tray in the mouth and apply a minimum amount of force in an upward and backward direction to seat it.

4. Hold the tray in position and apply tap water to chill.

5. Remove the impression from the mouth, hold it under the cold water faucet to remove all the saliva, and dry with cold air.

6. Inspect the impression carefully for defects: (1) if it includes all the area that is to be included in the denture, (2) if the tray is not exposed at any point, (3) if the compound shows no pull at any point, and (4) if the peripheral is correctly muscle trimmed a satisfactory preliminary impression has been obtained.

Lower Preliminary Impression—1. Select a lower tray that is overextended in all directions.

2. Correct the overextension, either by trimming or bending the tray.

3. The tray must extend anteroposteriorly to include the retromolar pads and posterior lingual aspect to include the throat form.

4. Buccolingually it must extend to include the internal oblique line to the external oblique line.

5. In the anterior region it should extend on the labial aspect to the muscle fold, on the lingual aspect to the muscle attachment.

Completing the Lower Preliminary Impression—When the tray is trimmed and bent to cover the area that is to be included in the impression with no impingement on any tissue the lower preliminary impression may be taken:

1. Fill the prepared lower tray with modeling compound heated to the correct consistency; when it is centered in the mouth, apply a minimum amount of downward pressure to seat it. The patient's position in the chair is the same as it was for the upper.

2. Chill with tap water, remove from the mouth, and hold under the cold water faucet to remove saliva. Dry with cold air in the same manner as that used with the upper impression.

3. Inspect the impression for defects. If (1) all the area included in the impression is covered, (2) there is no pull on the compound, and (3) the tray has not cut through the compound, the case may be poured.

Pouring and Marking The Cast

1. Stone casts are poured in the preliminary modeling compound impressions; upon setting and separating, the casts are examined for defects.

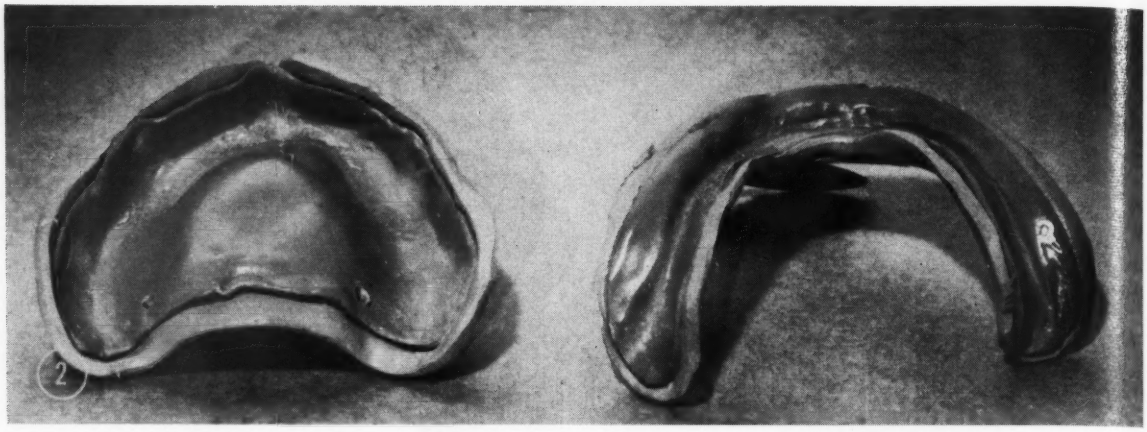
2. If the casts are found to be satisfactory, they are studied, and that area to be included in the finished impression tray is marked with pencil. The markings on the casts are directions concerning labial and buccal margins and the extension on the palatal aspect for the technician to follow in the construction of the finished impression tray.

3. The lower cast from the preliminary impression is studied to determine where peripheral margins are to be placed and so marked with pencil.

4. The technician is also instructed to place a handle of some form on the upper tray and on the lower tray.

Relief of Pressure—From the examination of the patient's mouth areas where pressure is to be relieved in the finished dentures are indicated to the technician by penciling these areas on both of the casts made from the preliminary impression. The technician is instructed how much relief is to be afforded over these areas.

Method—Relief is accomplished by the use of tin foil and the degree depends on the thickness and the num-



ber of sheets of tin foil used. Over the tinfoiled and penciled case made from the preliminary impression the technician makes a spacer that covers the area almost to the peripheral border on the labial and buccal aspects of the upper. The lower is also brought just short of the peripheral border on the lingual margin as well as the labial and buccal aspects.

Construction of Spacer And Tray

The spacer and tray can be constructed of baseplate, acrylic material, or other denture base material of choice. It can be the thickness that is considered necessary. The spacer constructed by the technician is made of baseplate, one sheet thick. The spacer is made to fit snugly over the cast. The spacer is treated so that the finished impression tray that is made over the space will not stick to the spacer. The margin of the tray is to extend up to the pencil marking on the cast. The spacer and tray are to fit fairly snugly on the cast, while the spacer should fit accurately in the impression tray. It should be possible to separate the spacer from the tray with little difficulty later when the tray and spacer are removed from the cast and the fitting is finished in the mouth. The upper tray with the spacer in the tray should fit the upper arch quite snugly.

2. ***The finished upper and lower spacers and trays made from the casts of the preliminary impressions. On the upper note how the trimming conforms to the mucobuccal fold, the frenum, and muscle attachments. Also note the hole in the upper spacer and tray for the dental floss used as a "handle" in the rear of the upper impression. Compare the lower spacer and tray in size to the large, overextended impression in Figure 1. This spacer and tray extends from the internal oblique line on the lingual to the external oblique line on the buccal and from the muscle attachments in the anterior region on the lingual to the mucobuccal fold on the labial.***

3. ***Note on the upper impression the coping of the mucobuccal fold in the finished impression, the proper imprint of the frenum and muscle attachments as well as the extension in the palatal region. Observe how the finished lower impression conforms to the anatomic landmarks in this region. These margins are all scientifically placed to conform to anatomic requirements.***

Trimming the Spacer and Tray to Comply with Mouth Conditions

1. Hold the tray in place and examine it carefully for fit. If it is satisfactory, plan for trimming on the buccal and labial portion of the tray.

2. The trimmed tray should be from 1/8 to 3/16 of an inch from the buccal and labial folds.

3. The frenum and muscle attachments must also be relieved in the tray. Should the trimming extend to the spacer no problem will result.

4. The posterior margin of the upper tray should be trimmed to extend about ¼ inch beyond the margin of the hard and soft palate. This is an individual problem; if too sensitive the extension may be less.

5. When the tray fits according to specifications, take a No. 3 round bur and make a hole on each side of the tray large enough to accommodate a double strand of dental floss. These holes are located just short of the posterior border of the spacer and approximately ¼ of an inch from the tuberosity on each side.

6. Push the prepared double strand of dental floss through the holes in the posterior palatal border of the upper tray, pull across and push down in the other hole; tie the ends of the floss in a surgeon's knot, leaving enough floss to grasp with a hemostat when the finished impression is removed. The spacer can be removed before or after the hole is drilled.

Completing Impression With Impression Paste

1. Fill the prepared tray with impression paste (Coe-Flo, Ackerman, or similar material).

2. Place the tray gently in position in an upward and backward direction with just enough force to place it correctly in the mouth. As the tray is held during setting, hold the floss aside so it will not cause discomfort to the patient. After the impression is seated if the patient is relaxed his mouth will be nearly closed.

3. It will be unnecessary to make any effort to obtain a muscle-trimmed impression. The soft paste now occupies the space which the spacer formerly occupied in the tray. Hold it in place until the paste is rigid. Give a moment of grace.

To Remove the Upper Impression—When the impression paste is set, grasp the loop of dental floss in the rear with hemostats or pliers and the handle attached to the tray in front and gently tease it loose from the tissues. It is sometimes difficult to remove the upper impression. After it is removed it should be carefully inspected.

A Satisfactory Impression—(1) If there is no evidence of pull on the finished impression, (2) if the margins on the labial and buccal aspect have followed the mucous fold, (3) if the margins are clear, (4) if the frenum and muscle attachments are plainly evident, and (5) if the tray has not cut through the impression paste at any point, a satisfactory upper impression has been obtained.

Corrections—If the tray has cut through in an area where it was planned to place the postdam, no damage will be done to the impression. If it cuts through in another area, remove the impression paste, trim the area that showed through, fill the tray with paste and retake the impression.

Completing Lower Impression

Fit the lower impression tray and spacer in the mouth and note the buccal and labial margins; they are slightly overextended. The objective is to have the margin on the buccal extend slightly over the external oblique line but in no way to impinge on the tissues or interfere with muscle function. On the labial the margin should extend to the muscle fold without any interference whatever in lip movement. The posterior margin at the crest of the ridge is to cover the retromolar pad at the junction of the buccal margin with the lingual. The placing of this posterior lingual margin is governed by the classification of the lateral throat form by the method already described in this paper.

Procedural Steps—1. It is helpful to place the index finger just back and below the retromolar pad and have the patient extend the tongue. If a forward and upward muscle is felt, move the finger to where this feeling is negligible. When the tray with the spacer is replaced inside on the ridge, note the margin in this throat form area and trim to where the tongue has no interference in this area.

2. Locate the internal oblique line and extend the lingual margin to this line in the bicuspid and molar area.

3. In the lingual anterior region extend the margin from cuspid to cuspid. The margin of the tray should extend to the soft tissue covering all hard areas that are due to excessive absorption here, but not to the extent of causing irritation or interference with function.

4. The ideal fit of the spacer and tray allows the patient to be able to thrust the tongue in either cheek or extend it forward and not unseat the tray. At this step it is sometimes noted that the spacer and tray fit in the manner of a finished impression.

Final Steps—1. Remove the spacer. Mix the impression paste according to the instructions of the manufacturer, fill the lower tray and carry it to the mouth. The patient should be as relaxed as possible.

2. Seat the tray with as little force as possible and hold in place as lightly as possible until the paste has set.

3. Feel the handle on top of the tray for resistance in its removal. If the resistance is considerable, have the patient close the mouth as much as possible and tease the tray loose or float it loose with water from the water syringe.

Summary

The technique described is easy to learn and apply and can be useful for nearly all full denture cases. It is time saving because it is not complicated. The preliminary impression takes approximately twenty minutes. The time required to finish the impressions depends on the difficulties to be surmounted and the skill of the operator.

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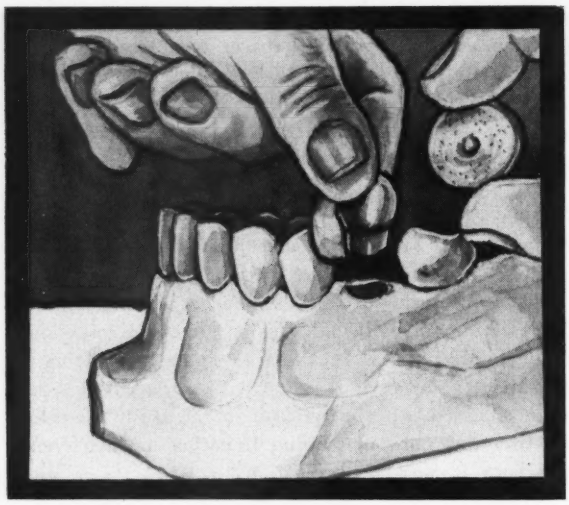


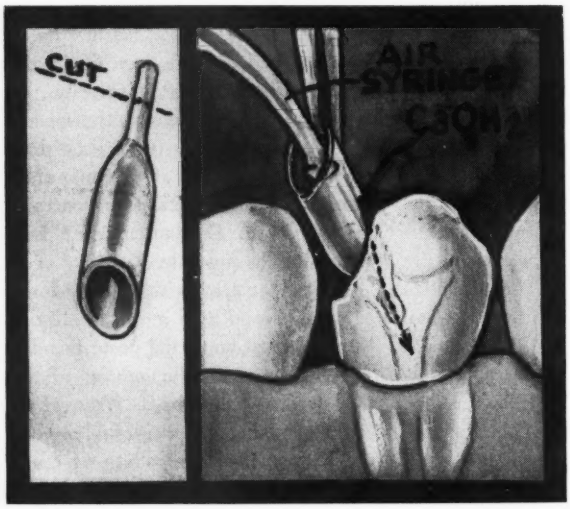
1

Clinical and Laborator

Finishing Margins on Wax Patterns

Robert H. Orrahard, D.D.S., Dallas

1. In finishing wax patterns that are on dies, use a fine sandpaper disc held in the fingers to smooth and finish the margins and to contour the wax.

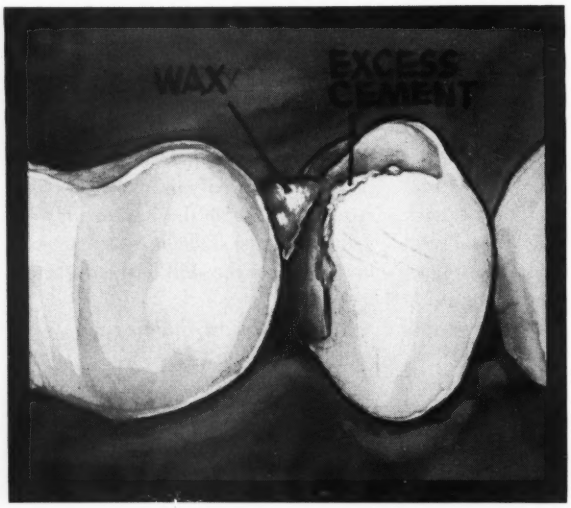


2

Placing Calcium Hydroxide on the Pulp

B. M. Weinger, D.D.S., San Pedro, California

2. To place powdered calcium hydroxide on residual tissue after pulpotomy, put calcium hydroxide in a "jiffy tube." Cut off the end of the tube. Carry the tube to place within the pulp chamber with a hemostat. A gentle blast of air into the "jiffy tube" will carry the calcium hydroxide powder to position to cover the remaining pulpal tissue.



3

Cementation of a Gold Inlay

Douglas L. Roberts, D.D.S., West Orange, New Jersey

3. Place a small amount of utility wax at the contact area of the inlay to prevent the cement from sticking at that point. After the inlay is cemented, the wax is easily removed with dental floss.

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SUGGESTIONS . . .

Flavoring X-ray Films

James D. Jacoby, D.D.S., San Mateo, California

4. In the top section of an intraoral x-ray film dispenser place a cotton roll that has been moistened with a dozen drops of oil of wintergreen or oil of peppermint. This adds a pleasant flavor to the film.

4

Removal Button on a Casting

Herbert E. Rashkind, D.D.S., Long Island City, New York

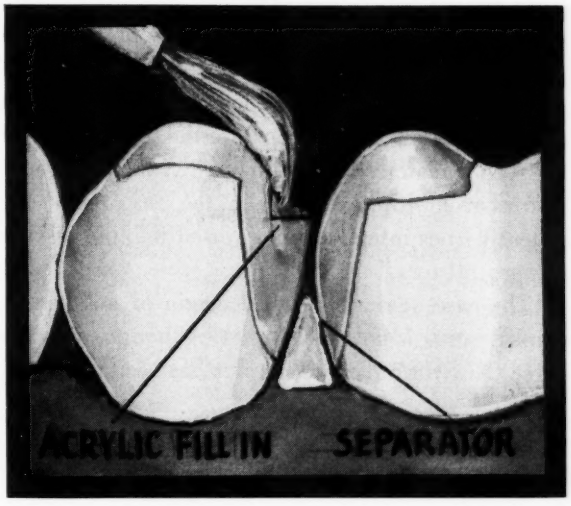
5. An extra drop of wax placed on the lingual surface of a wax pattern (or a piece sweat-soldered to a crown) will facilitate removal of individual crowns or bridge abutments. The button is ground off and the surface polished before cementation.

5

To Correct the Contact on a Gold Inlay

Carl Allen, D.D.S., Rochester, New York

6. When the contact is unsatisfactory, prepare a box cavity in the gold inlay at the occlusal-contact area. Use a separator to spread the teeth and adjust a steel matrix in position. Paint with self-curing acrylic to restore the contact point.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 326 for a convenient form to use.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S *Page*

A RED BLOOD cell is seven times larger than a staphylococcus. A red blood cell is 70,000 times larger than the smallest virus that has been discovered. These figures give some idea of the smallness of the viruses that cause disease.

Viruses are intracellular parasites. They contain no energy-producing enzymes and thus depend upon a living host cell for their life and activity. They infect men, animals, plants, insects, bacteria, and fungi.

Viruses produce conditions that are seen by the dentist: herpes (cold sores or fever blisters), aphthae (canker sores), and acute herpetetic gingivostomatitis which should not be confused with ulceromembranous gingivitis or Vincent's infection.

The first condition (cold sores or fever blisters) is described by Dubos:[1]

"During the past two decades many types of substances, procedures, or accidents have been shown capable of bringing about conditions under which latent microorganisms can manifest their potential pathogenicity and cause overt disease in man, animals, and plants. The very banal case of fever blisters caused by the herpes simplex virus will suffice to illustrate some of the modalities of the phenomenon. Many human beings become infected with the virus early in life and develop against it neutralizing antibodies that are present in detectable titers in their serum. This immune reacation prevents the virus from causing a generalized infection but is incapable of eliminating it from the tissues, where it persists often for the lifetime of the individual. The equilibrium between host and virus is, however, extremely unstable and can be upset by many nonspecific disturbances. Excessive insolation, improper food, menstruation, or fever of unrelated origin alter the tissue response in such a manner as to allow the virus to undergo transient multiplication, with the result that the latent herpes infection is converted into the disease herpes blisters."

The case against the viral origin of aphthae or canker sores is not so clear cut. Although, on occasion, the virus of herpes simplex has been recovered from these lesions, the experience among virologists has not been unanimous.

In their complete and up-to-date book, Blank and Rake[2] describe the clinical entity of an acute gingivostomatitis of viral origin that should not be confused by dental clinicians with acute ulceromembranous gingivitis of bacterial origin:

"The commonest form of clinical primary infection is *acute herpetic gingivostomatitis* (acute ulcerative or acute infectious stomatitis). It is most often seen in children between 2 and 5 years of age but can occur into young adulthood. The painful oral symptoms have an acute onset and are associated with regional lymphadenopathy, high fever and malaise, giving the appearance of an acute serious systemic disease. The lesions in the mouth are at first isolated white plaques and later ulcers, which may become widespread and involve any part of the mucous membranes of the mouth, including the tongue and the tonsils. The gingivae are usually swollen, with red edges that bleed easily when touched with a tongue blade. Foul breath and pain, particularly with eating or drinking, are marked. Dehydration and acidosis may become severe in infants. After 7 to 10 days the symptoms lessen, and in 10 to 14 days the patient is usually recovered. Dodd *et al.* (1938) were the first to isolate herpes simplex virus from the mouth in this disease, and Burnet (1945) demonstrated the appearance of neutralizing antibodies, which established the cause beyond doubt. Formerly herpetic gingivostomatitis frequently was erroneously called 'trench mouth' or Vincent's gingivostomatitis, but it now seems clear that the fusospirilla present in the necrotic epithelium have no etiologic importance in herpetic stomatitis. It is thought that most cases of 'trench mouth' with systemic symptoms in children are primary herpes simplex infections."

These three definite clinical entities that are described in the excellent book by Blank and Rake show the dentist that viral diseases are within his purview as well as within the field of the physician. If the Salk vaccine is shown to be a virtual specific against poliomyelitis it is conceivable that a similar kind of vaccine can be developed to protect against the several manifestations of disease produced by the herpes simplex virus.

[1]Du Bos, Rene J.: Unsolved Problems in the Study and Control of Microbial Diseases, JAMA **157**:1478 (April 23) 1955.
[2]Blank, Harvey, and Rake, Geoffrey: Viral and Ricksettsial Diseases of the Skin, Eye and Mucous Membranes of Man, Boston, Little Brown and Company, 1955, p. 49.

MEDICINE and the Biologic Sciences

Oral Fat Preparations

An adequate caloric intake is essential during disease. A high caloric intake may be attained with small bulk by means of a fat-carbohydrate emulsion, when a patient is unable to consume foods of the proper nutritive value.

Utilization of proteins is increased when fat is added to a diet containing only marginal quantities of protein. Fat has a high caloric value: 9.3 calories per gram. A combination of fat and carbohydrate furnishes a large amount of readily assimilable calories and spares the body protein catabolism. Also, nitrogen and potassium deficits from inadequate caloric intake can be remedied by supplementary fat.

The commercially available fat-carbohydrate emulsions, Lipomul-Oral,® and Ediol,® contain 40 and 50 per cent vegetable oil (peanut and coconut) and 10 per cent glucose in water together with an emulsifying agent, an antioxidant, and a preservative. Even in relatively high doses, these are assimilated and well tolerated.

The emulsions are best administered mixed with water, milk, or fruit juices when used with a regular diet. The preparations may be given undiluted in doses varying from 15 to 120 cubic centimeters at intervals of several hours or by drip through a nasal tube, if necessary.

Fat-carbohydrate emulsions are valuable in the management of patients with acute renal failure. The emulsions are free of protein and salts and provide sufficient caloric intake to reduce the endogenous body protein catabolism. Approximately 250 cubic centimeters of the emulsion furnishes 1,000 calories. This, supplemented by sufficient glucose in water, orally or intravenously, keeps a patient with complete anuria in good condition with a slowly rising nonprotein blood level for ten to thirty days.

Large amounts of fat emulsion may cause undesirable side effects such as: (1) nausea, (2) vomiting, (3) diarrhea and (4) constipation. Usually these are slight and transitory and do not require cessation of therapy.

The emulsions are effective as supplementary feedings for underweight or malnourished patients, especially before operations. From 30 to 120 cubic centimeters may be diluted in a glass of water or milk and taken between meals or at bedtime.

Many patients with febrile illnesses, hyperthyroidism, burns or fractures have an increased rate of protein catabolism, making supplemental feeding with emulsions desirable. The emulsions are also of special value in nutritional therapy for tuberculosis or for poliomyelitis and to offset the catabolic effects of cortisone and corticotropin for patients receiving steroid therapy.

Grollman, Arthur: The Use of Oral Fat Preparations in Medicine, J. Clin. Nutrition **1**:302-305 (*August*) 1953.

Carcinoma of the Larynx

Of all groups of persons the middle aged male group is most prone to laryngeal cancer. Carcinoma of the larynx is 12 times as frequent in men as in women. In most males the lesion is recognized between the ages of 50 and 70. In females it is recognized at a slightly younger age.

It has been noted that about one-third of the patients are excessive drinkers and nearly one-half smoke or chew to excess. Quite a large number of patients are metal workers with known exposure to proved irritants of the respiratory mucous membrane. Some of the patients are employed in occupations associated with oil, grease and tar. Few use the voice to excess, as in preaching or singing.

Acute and chronic infections may be important in the pathogenesis of laryngeal carcinoma. Nearly one third of patients have some form of tuberculosis. However, associated tuberculosis of the larynx is extremely rare.

The dental aspect of the problem is important as nearly three-fourths of the patients have carious teeth or oral sepsis. It appears that the effect of a constant stream of infected saliva upon the larynx must be considered. Premalignant lesions, such as hyperkeratosis and leukoplakia, are rarely found before the discovery of laryngeal cancer.

Frequently a septal deviation with obstruction is noted. Conceivably, metaplastic changes may occur in the mucous membrane of the larynx and lower respiratory tract if the flow of air is increased in one nostril and if the impact of cold, dry air continues long enough.

The most frequent symptom is hoarseness. Other common symptoms are (1) nonspecific cough, (2) decreased general vigor, (3) dsyphagia, and (4) dyspnea. Any of these symptoms are common enough to justify routine laryngoscopic examinations after the age of 40.

With cancer of the larynx the first biopsy report is not uncommonly negative. Therefore, any suspicious looking lesion should be watched carefully and biopsies repeated several times, if necessary.

At the time of diagnosis, cervical node and pulmonary metastases may be found. If metastatic nodes are pal-

pable, surgery is frequently withheld. Nearly all the tumors are epidermoid carcinoma. Women are more likely than men to have other types of malignant growths.

Kirchner, John A., and Malkin, Jocelyn S.: Cancer of the Larynx, Arch. Otolaryng. **58**:19-30 (*July*) 1953.

Rehabilitation Factors

Several factors determine whether or not a handicapped patient can become a productive member of society. The age at which the disablement occurs has an important influence on the patient's adaptability. People who are disabled at birth are the least likely to be successful in obtaining jobs.

Of all disabling conditions it appears that poliomyelitis patients have the best prognosis for employment. Those who have cerebral palsy have the worst prognosis.

When a person who was healthy at birth is disabled before the age of 30, the chances of compensating for the disability in the achievement of employment are good. Intelligence is important. The intelligence quotient as measured by standard tests is closely related to education and, therefore, to vocational achievement. Even in groups of similar education, however, the chances for employment increase as the intelligence quotient goes up.

Other compensating factors in attaining employment despite disability are achievement of physical independence and at least part of a high school education. Handicapped persons with these advantages show better work records. Lack of any of these compensating factors decreases the disabled subject's chance for employment even with relatively slight disability.

The degree of severity has much to do with the question of employment. Today, however, many severely handicapped persons are employed. Many of the persons who have had poliomyelitis are employed. Only a small percentage of those with cerebral palsy are employed.

Lesser, Marion S., and Darling, Robert C.: Factors Prognostic for Vocational Rehabilitation Among the Physically Handicapped, Arch. Phys. Med. and Rehabil. **34**:73-81 (*July*) 1953.

Noise

With the advent of power-driven machinery the effects of unwanted sound have become an increasing source of trouble to man. Two types of noises are recognized: (1) sharp, sudden noises of acute exposure, and (2) continuous or regularly intermittent noises associated with chronic exposure.

The undesirable effects of noise are classified as (1) effects on efficiency, (2) effects on auditory acuity, and (3) effects on communication.

The most commonly used unit for measuring sound is the decibel. The range of human hearing is up to roughly 130 decibels.

In general, noise has an adverse initial effect of slight magnitude. This rapidly wears off through adaptation whether the task be chiefly mental or muscular. Frequently cessation of noise results in another brief period of slightly decreased efficiency. Man can maintain the same level of performance for many activities in a noisy as well as a quiet environment.

In some persons, including neurotics, exposure to noise for several hours may result in the following reactions: (1) vague uneasiness, (2) headache, (3) otalgia, (4) tremors, (5) nausea, (6) vertigo, (7) tenseness, or (8) insomnia. Exposure to noises of extreme intensity, over 120 decibels, causes (1) heating of the skin, (2) blurring of vision, (3) apparent muscular weakness, and (4) loss of hearing. All of these effects are reversible. A loud unexpected noise may cause a rise in blood pressure and a decrease in gastric peristalsis and gastric secretion.

The factors that influence the effects of noise on man are the following: (1) noise is sound of unwanted character, (2) extremes of pitch or frequency, (3) extreme loudness, (4) unexpectedness, (5) uncertainty of the direction from which it comes, (6) unfamiliarity or inability to identify its cause, and (7) the state of health of the person exposed.

Although either temporary or permanent deafness may result from exposure to noise, it is not clear just what intensity is required to damage the auditory nerve. There is ample evidence that no permanent damage results from prolonged exposures to intensities of about 85 decibels. Brief exposures lasting up to one hour may cause some hearing loss if the intensity is 100 decibels regardless of the frequency. Pain will follow exposures to 140 decibels and rupture of the eardrum occurs at levels of 160 decibels or more. When there is chronic exposure, the greater the intensity of the sound the greater the resultant hearing loss. The loss is greatest for the dominant frequency in the damaging noise and for the frequencies above that level.

The possible relationship between noise and health needs further study. Today many studies are being conducted in view of the problems related to modern industry.

Editorial: Noise, JAMA **154**:412-414 (*January* 30) 1954.

Bronchogenic Carcinoma

Lung cancer is primarily a disease of older people. Approximately 38 per cent of the cases are found in the sixth decade. It is predominately a disease of males. And the white race is affected more frequently than the Negro race.

Usually the diagnosis is not too difficult when proper steps are taken to prove or disprove its existence. Roentgenography is the most valuable diagnostic method because of the ease with which it is done and because of the high incidence of positive findings. A tumor large enough to produce a shadow in the lung field can be seen on roentgenograms and should always arouse suspicion. This diagnosis is only presumptive, yet it calls

attention to a lesion in the lung and suggests the need for additional investigation.

Incomplete bronchial obstruction suggests bronchogenic neoplasm. If this occurs in a man past 40 it usually means carcinoma. Such a condition occurs when air gets around the tumor during inspiration as a result of dilatation of the bronchial tubes; during expiration because of contraction of the bronchus, air is not allowed to get out, thus causing a localized obstructive emphysema.

Positive diagnosis of bronchogenic carcinoma can be made only by demonstrating carcinoma in all cases in which carcinoma is suspected. Unfortunately, over half the lung cancers occur in the upper lobe and occasionally in the periphery so that the lesion is often beyond bronchoscopic vision.

Careful cytologic examination of the sputum is extremely important in diagnosis. It makes little difference if the material is obtained by aspiration during bronchoscopy or by expectoration, as the finding of tumor cells makes a positive diagnosis of bronchogenic carcinoma.

Positive diagnosis can be made in only 80 per cent of cases preoperatively. Therefore, thoracic exploration is necessary in about 20 per cent of cases.

The only curative treatment of bronchogenic carcinoma is the removal of the entire involved lung together with dissection en bloc of all the mediastinal lymph nodes. Careful pulmonary function studies must be made to determine whether the patient can tolerate a pneumonectomy. Only in those patients who could not tolerate such radical surgery is an

CLINICAL AND LABORATORY SUGGESTIONS

(See pages 318 and 319)

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operation short of a pneumonectomy permissible.

The present outlook in treatment of bronchogenic carcinoma based on current statistics is not good. Only an approximate 6 per cent of all patients with lung cancer are alive at the end of five years. Of the resected cases, 15.2 are alive at the end of five years. The low operability incidence is undoubtedly due to the fact that in many cases there is a delay before a diagnosis is made and definitive treatment started.

Ochsner, Alton; DeCamp, Paul T.; and Ray, C. J.: Bronchogenic Carcinoma with Emphasis on Early Diagnosis, Geriatrics **9**:15-19 *(January)* 1954.

Isoniazid in Tuberculous Patients

When isoniazid was introduced in 1952 remarkable results were achieved in the treatment of tuberculosis patients. There was uncertainty among physicians as how best to incorporate the new drug into current treatment programs. The two main questions were (1) whether isoniazid was as effective as streptomycin plus para-aminosalicylic acid, and (2) how frequently could results similar to those obtained in the pilot trials be expected.

Since April 1952 a large scale control study of isoniazid has been under way in 22 tuberculosis hospitals. This study was started by the United States Public Health Service.

Comparison of the results shows isoniazid plus streptomycin to be slightly superior to the other two regimens (1) streptomycin plus para-aminosalicylic acid, and (2) isoniazid alone. These last two are approximately equal.

The similarity of the results of the three regimens and the fact that only about one half of each group showed significant improvement in the roentgenogram during treatment led to an examination of other factors that might influence the response to chemotherapy. The frequency of significant roentgenologic improvement has

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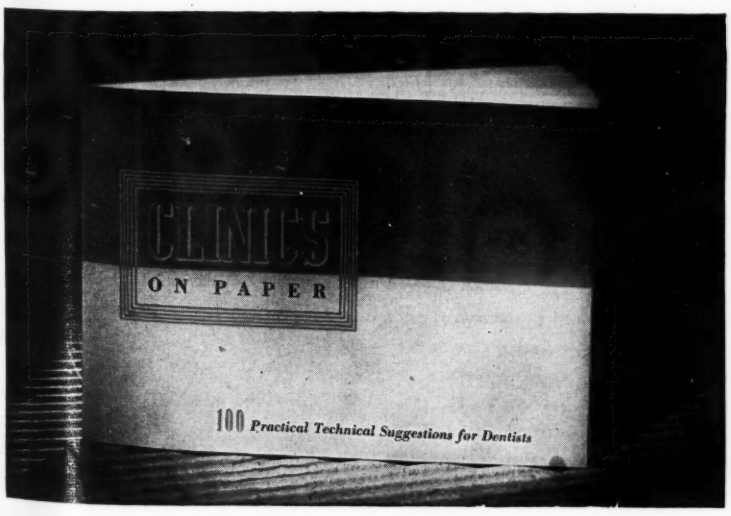

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been examined in relation to the age, race, and sex of the patient and the stage, extent, and duration of the disease. Evidence seems to indicate that in this group of patients (1) the age of the patient, (2) the duration of the disease, and (3) whether one or both lungs were involved were the factors most closely associated with roentgenologic improvement. The younger the patient, the greater the probability of improvement during treatment. Disease in only one lung improved more frequently than bilateral disease.

United States Public Health Service Cooperative Investigation: Control Study of Isoniazid: Factors Influencing Response of Pulmonary Tuberculosis to Chemotherapy, Dis. of the Chest **24**:361-378 (*October*) 1953.

Smoker's Respiratory Syndrome

The possible relationship of smoking and pulmonary carcinoma has received considerable attention in recent literature. Along with this some mention has been made of the effect of excessive smoking on the larynx.

Edema is first noted in a localized area of one of the vocal cords. As the condition progresses this becomes bilateral and edematous fibromas are formed. If the condition is of long standing it becomes irreversible and must be treated by surgical removal.

Another condition is a clinical entity known as smoker's respiratory syndrome. This condition is characterized by a triad of symptoms consisting of chronic pharyngitis, wheezing and dyspnea and a tendency to respiratory infection with or without fever. The pharynx is fiery red and may be covered with a mucopurulent discharge. Small lymphoid nodules form on the wall of the pharynx. Other symptoms include (1) cough, (2) chest pain, (3) hoarseness, and (4) discomfort.

The wheezing may be explained by the fact that the mucus formed by the chronic inflammation partly obstructs the air passages. The presence of mucus and the broncho-constrictor action of nicotine account for the sense of constriction in the chest, the bronchospasm and the dyspnea.

The condition is extremely common and is often mistaken for bronchial asthma or bronchiectasis. Unlike asthma, this syndrome has no allergic basis. The wheezing is confined to the trachea and the upper portion of the chest. Emphysema, if present, is slight. There is no eosinophilia, and the vital capacity is only slightly decreased. Some patients may have both asthma and the respiratory syndrome.

Early cases are reversible and require only the elimination of smoking to effect a cure within about seven days. The symptoms return if smoking is resumed. More advanced cases require antibiotic treatment in addition to avoidance of tobacco smoke. A few are so far advanced as to be irreversible.

The recognition of this condition is important in order to prevent subjecting the patient to troublesome and unnecessary allergic testing or visualization of the bronchial tree and to remove the cause before advanced changes take place.

Editorial: Smoker's Respiratory Syndrome, JAMA **154**:340 (*January* 23) 1954.

The American Institute of Dental Medicine

THE NEXT annual meeting will take place at the Desert Inn, Palm Springs, California, October 23 to 27, 1955. The faculty will consist of:

Maury Massler, D.D.S., M.S., University of Illinois, Chicago: Effects of filling materials on the pulp; Sterilization of dentin; Tissue changes during aging.

Valy Menkin, M.D., Temple University Medical School, Philadelphia, Pennsylvania: Inflammation, bacterial invasiveness and immunity; Chemical factors liberated by injured cells in inflammatory exudates; The anti-inflammatory problem with particular emphasis on the mechanism concerned, as induced by corticosteroids.

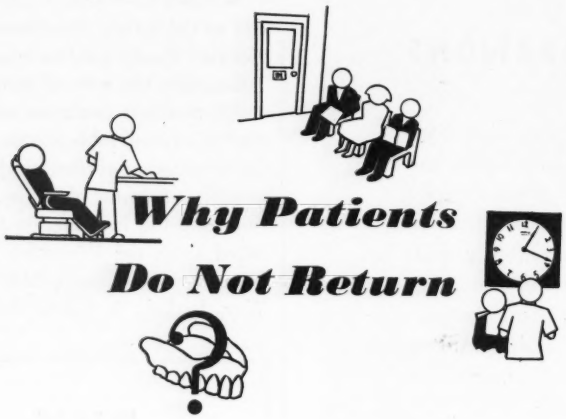
Hans Selye, M.D., University of Montreal, Montreal, Canada: Recent progress in the study of stress as applied to dental medicine.

Reidar F. Sognnaes, D.M.D., Ph.D., Harvard School of Dental Medicine, Boston, Massachusetts: Relative significance of cellular and chemical remodeling of bones and teeth as revealed by radio-active isotopes; The complexity of the caries problem suggested by recent observations in experimental animals; The clinical implications of experimental caries research.

Wendell L. Wylie, D.D.S., University of California, San Francisco, California: Tooth guidance and factors influencing the rate of eruption.

All Seminar lecturers will participate in a round table forum discussing the application of their subjects to the practice of dental medicine. Applications and full information may be secured from the Executive Secretary, Miss Marion G. Lewis, 2240 Channing Way, Berkely 4, California.

In your ORAL HYGIENE this month



Why Patients Do Not Return

Doctor Maurice J. Teitelbaum says, "Of course, there are reasons why patients desert us that are beyond our control," and his article is not concerned with these reasons. He lists the four main reasons *within* the control of the dentist—and gives a fifteen-question check-list to help the individual dentist determine whether—and where—he may be at fault.

★ ★ ★

Do you ever tire of civilization and the demands it makes on the professional man? Do you ever yearn to step out of character and seek adventure? Then do as Doctor William E. Wood has done—go prospecting for uranium! Omer Henry tells of the adventure—and relays Doctor Wood's suggestions and advice to other dentists who would like to follow the lure of the Geiger counter. You will want to read, "Uranium: It Is Yours for the Taking."

★ ★ ★

Doctor Robert P. Stickley gives us another conversation with "Wilbur"—this time on the subject of contributions and how to fit them into the dental budget *in advance*. "Wilbur is never coerced into giving more than he can afford, nor does he find himself without funds when his favorite charities make their annual appeal.

★ ★ ★

A Colonel in the Dental Corps has just perfected an electronic thermometer which medical men say represents "the first change in clinical thermometers since the mercury-column type was introduced in 1869." Richard La Coste describes Colonel George T. Perkins' "Swiftem" which may someday permit remote meter readings of the temperatures of every patient in a hospital ward.

★ ★ ★

"A dentist who has his office and residence under one roof is often enabled to practice his profession long after he has passed his prime physically," says Doctor Philip Parker. "Shuttling back and forth between your office and residence is a waste of time at any age." Doctor Parker has reached these conclusions after trying both types of practice—the separate office and "A House Divided."

★ ★ ★

"Some features of OASI are liberal, provided one qualifies. But there are so many 'ifs' in the plan, that self-respecting, independent, professional men should think before surrendering one more freedom to a paternalistic government. Doctor Wendell H. Taylor compares Old Age Survivors Insurance with other types of insurance and decides, "I Prefer Life Insurance to OASI."

★ ★ ★

Don't forget the regular departments: "So You know Something About Dentistry!," "Technique of the Month," "Dentists in the News," "Ask Oral Hygiene," and all of the others. There's a lot of pleasure—and profit in reading these monthly one and two-page features.

Contra-Angles

The Scarred Look for More Scars

In a little foray into the big outside world this columnist made some unflattering comments about television. The story was picked up by the *Chicago Tribune* and given a full-column treatment. Then my day began to sizzle.

I learned several things: that newspapers, and particularly columns written about entertainment are widely read; that people take their television seriously; and that any uncomplimentary remarks about favorite entertainers are considered in the same category as aspersion to one's ancestors and family; and finally, that the gentlemen sponsoring programs and making out the details in ulcer-ridden advertising agencies are sensitive souls on the subject of television. None of these remarks is to mean that my fan mail was all studded with brickbats. Actually (I almost repeated the conditioned vocal reflex, "as a matter of fact," which like "wonderful," is one of the obnoxious clichés of television) most of my letters were favorable.

Now that I have been battered and scarred by my excursion into the domain of TV critics, I am experiencing some kind of psychologic reaction. Rather than stay in the dark cellar brooding, licking my wounds, and being fearful to utter a word, I am experiencing some kind of psychologic expansion. For all I know, it may be the fearsome state of megalomania which I am told is a delusional form in which the sufferer acts or expands himself to great widths and heights. In my newly found and pleasant state I wish now to joust with the giant with billions of dollars: the automobile industry.

First, I must say that I know noth-

ing about the mechanism of an automobile although I have been driving one for 40 years. I am confused when a hood is lifted and the mechanical viscera are exposed. I have had reasonably good experience with automobiles because I resist a temptation to tinker. A mechanic friend advises me that his best customers, in the sense of profitable business to him, are those who are "do-it-yourself" addicts who take things apart and then call for help to put them together again. In my case he knows he will find everything exactly as it was when the car was delivered from the factory, including a few labels here and there that I have not yet got around to removing after many miles.

My friend the mechanic assures me that such simple proceedings as sandblasting spark plugs, applying a sort of electrocardiograph to the electric system of an automobile, and adjusting a recalcitrant carburator, are not chores for the layman. He makes me feel that my avoidance of these under-the-hood duties is a sort of superiority of character on my part rather than a stigma of gross incompetence. It could be, of course, that the automobile mechanic feels toward "do-it-yourselfers" as dentists do toward people who adjust their own dentures with a pocketknife or tighten clasps with a pair of pliers.

My case against the automobile has nothing to do with how many horsepower it has or how fast it can go, or how charming many automatic features may make your driving life. My gripe is against the mimicry of the manufacturers. If one bends his windshield or gives an upsweep to his fender, they all follow suit. If one sticks a bushy tail on his product, all would follow the practice. When one makes his radiator grille look like a waffle iron, every other manufacturer copies the act.

Time was when a Pierce-Arrow stood out long and elegant on the street and a Marmon was the sleekest looking thing on wheels. A Hupmobile was as sturdy and strong as the emblem of the Prudential Life Insurance Company. These manufacturers dared to be different and produce an individualistic product—now they are all out of business.

Today a Chevrolet has in a sort of diluted form the lines of its big brother, the Cadillac, and a Lincoln is a more mature Ford. There was a time when a Lincoln or Cadillac went down the street or stood in front of a house to command a feeling of profound respect, the kind of emotion that is given to unusual possessions—like a peacock in your back yard. Now when a car goes by or is parked it looks much like all others. All automobiles seem to have a common ancestor that turns out more and more progeny that *look* alike. I would like to repeat that I am not commenting on mechanical differences. I am sure that the higher priced cars must be superior mechanically. If they are not, people are paying a stiff premium for a fancy trade name and few more inches, pounds, and fancy fabrics.

I was glad to read in that fine dental publication, *American Journal of Orthodontics*, that another dentist feels as I do that automobiles are conveyances and not investments. They are conveniences and not works if im-

perishable art. The late Vernon L. Hunter, D.D.S. wrote:

"I can remember when I was 26 years of age. I had been fairly successful as a dentist in a relatively small town, and automobiles were my thrill and joy, or at least I thought they were. I bought a beautiful red sport model Cadillac for $4,700.00, when money was money and automobiles were, just as they are today, merely conveyances. I used to get out early in the morning so that I could get to the parking place right in front of my office where I could look down on it. It took me about three, maybe five, minutes to drive from my home to my office. Of course, it would have been much better, from a health point of view, had I walked. After working eight or ten hours in my office as hard as I could work, I would come out of the office, step into that car, put my hands on the wheel and my foot on the starter, and swell up to where I could hardly stay behind the wheel. In my own imagination, I felt that everybody was looking at me and, by the mere fact that I owned this beautiful car, realized that I was a successful, prosperous dentist. A few years afterward, I accidentally found out what they really thought One of my good friends was the president of the opposition bank. He was a very successful man who owned a big car and had it paid for. We played golf together and one day, some two or three years after I bought my car, he told me on the nineteenth hole of the golf course what he thought of me, what my patients thought of me, and what the townspeople thought of me; and for the first time I realized what the other fellow thought about me and that big car that I could not afford. He said, 'You think that people think that you're a prosperous, successful, well-to-do dentist and citizen. What the people think, though, is that you are a first-class fool and don't know it. Just a ridiculous fool when it comes to investments.' I analyzed it, finally, this way. I worked eight or ten hours daily to make some money, denying myself many of the conveniences of a modern dental office (the best investment for any dentist). There are always new things in dentistry and dental equipment that could be used to the advantage of the operator for lessening his hours of toil, for making it more convenient and more pleasant for him to work, and for lengthening his years of production. I denied myself these things, and for what? I was working eight or ten hours a day in the office for fifteen minutes a day in a $4,700.00 automobile. It is a matter of record that most dentists do not average one half-hour a day, year in and year out, in their automobiles.

"I have just finished examining the contract of a man who is buying a $7,600.00 Cadillac. He is making a down payment of $2,000.00, and paying for the rest of it at, roughly, $200.00 a month for thirty months. The interest, registering charges, and so forth on this deal come to 13 per cent, and that is the smallest part of it. I have checked with second-hand car dealers and they tell me that by

the time this car is paid for in thirty months this man will be fortunate if he gets better than $2,000 for it. That will leave $5,700.00 depreciation for two and one-half years, or practically $200.00 per month depreciation.

"You cannot own any kind of automobile for less than $200.00 per month, and if you go up into the Cadillac class, you probably will spend from $400.00 to $600.00 per month. Now, if you will stay in your own class, the class you should stay in if you intend to retire at any reasonable age, you will save from $200.00 to $400.00 per month.

"All that I ever saw the big automobile do is make a man's head swell to where — if he had any business judgment at all—he entirely misplaced that judgment or figured wrongly when he was purchasing an automobile or anything else.

"There is practically no hope, financially, for the dentist who buys one of these big cars each time he turns around, before his financial picture is secure. He is just a financial idiot."

Offhand I cannot recall that the automobile manufacturers are disposed to give much advice to owners about the proper upkeep of their expensive luxury. It is true that all cars have an owners' manual that gives some instruction for care and upkeep. Most of the "dental health" type of information comes from the oil companies who are selling premium gasoline and oils. I cannot, however, get too critical of the automobile people because I know that a good many *dentists* are in the same profit-minded category. The periodic prophylaxis—bitewing x-ray—simple operative procedure philosophy is giving way to the spectacular periodontal surgeon and the full-mouth reconstructor. I am not mad at dentists in either of these categories. I am just saying that ethics in the contemporary culture are apt to be the same among automobile manufacturers, dentists, and everybody else. No better, no worse, just the same—furiously dollar grabbing.

—E. J. R.